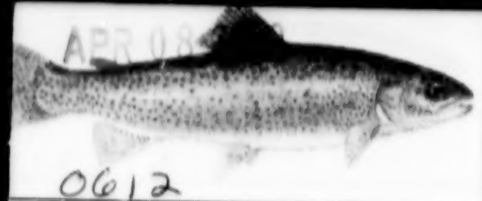

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ANNUAL REPORT

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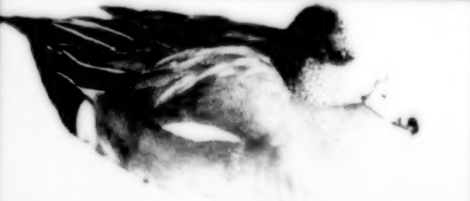
COOPERATIVE FISH AND WILDLIFE RESEARCH UNITS

Research • Technical Assistance • Education



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FY 2002

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COOPERATIVE FISH AND WILDLIFE RESEARCH UNITS PROGRAM

Annual Report
Fiscal Year 2002

Prepared by
Don Dennerline

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Cover Photo:

Alaska Coop Unit student Corey Adler with radio-tagged moose. Photo provided by Corey's major advisor, Dr. Abby Powell (AUL - Alaska Unit). Photo was taken by Rick Swisher.

To our Unit Cooperators:

Each year the national Cooperative Research Units (CRU) program office compiles a report of accomplishments that have been achieved through partnerships with the Cooperative Fish and Wildlife Research Units. This information is summarized as part of an effort to improve communications among Cooperators and partners. Again this year, we are distributing the CRU annual report just prior to the North American Wildlife and Natural Resources Conference, so as to make it available for the CRU Cooperators' meeting at the Conference.

As in the past, the annual report documents successes of the program in meeting our mission goals for research, graduate education, and technical assistance. However, this year's report also includes a number of changes that have been requested by the Cooperators. For example, we have included separate pages for each of the Units, with information on personnel and activities at individual Units. We have added some additional graphs in an effort to display trends over time. Finally, we have included new information on academic activities and technical assistance, to better describe the efforts of Unit scientists in these important areas. To enhance readability as well as content, we also have updated the report's format and the display of the information in it. All these changes have been motivated by Cooperators' feedback and suggestions about how to improve the annual report. We hope the result is a document that better serves your needs. Please take a few minutes to review it, and see the positive results of your efforts on behalf of CRU. And be sure to let us know if there are other changes you would like to see.

The Cooperators are scheduled to meet at the North American Conference on Thursday, March 27, 2003, from 3-5 pm in Terrace 2, Western Tower, 2nd Level of the Adams Mark Winston Plaza Hotel Winston-Salem, North Carolina. At that meeting we will summarize some of the data in the annual report, discuss the budget outlook for CRU, and briefly highlight some trends in the Units program. Rollie Sparrowe will distribute and facilitate discussion about a report that summarizes feedback and recommendations from partners on future directions and implementation strategies for the Units. I urge you to attend the meeting and participate in this discussion; your perspective is needed as we adapt to the challenges facing the Units, while ensuring that the program remains healthy and productive over the long term.

Just as the Cooperative Research Units are your Units, so is the Annual meeting your forum to discuss issues and concerns. We thus are soliciting your ideas for its agenda. If you wish to place additional topics on the agenda, please call the Cooperative Research Units national office (703-648-4260) or e-mail Jim Fleming at jim_fleming@usgs.gov.

I look forward to seeing you at this year's North American Wildlife and Natural Resources Conference.

Sincerely,

Byron K. Williams

Byron K. Williams
Chief, Cooperative Research Units

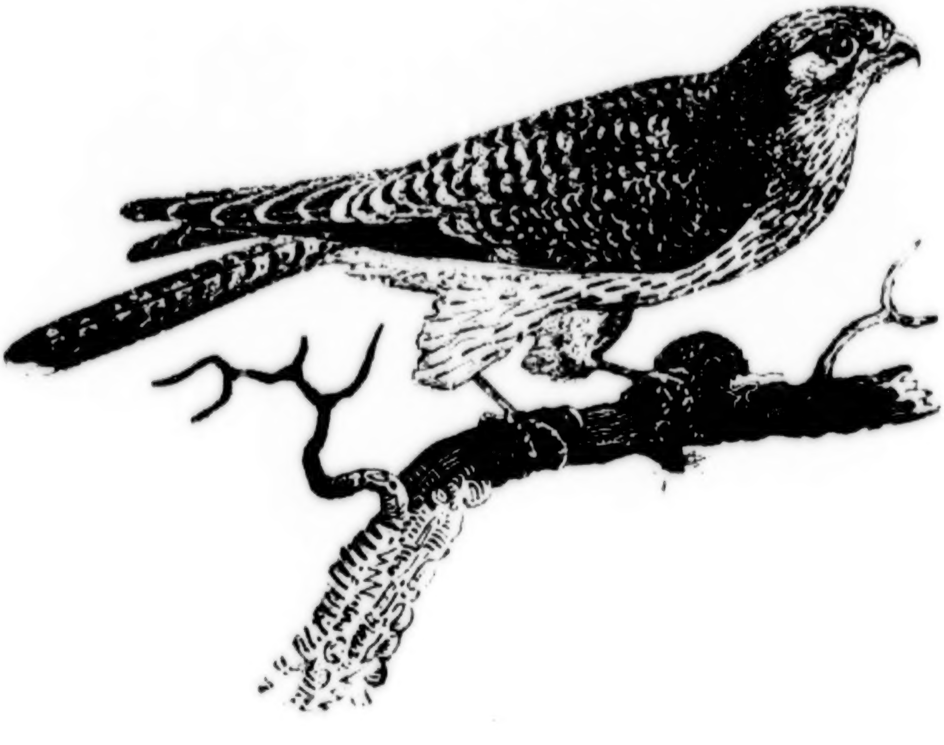


TABLE OF CONTENTS

Cooperative Research Units Program 1

Program Highlights for FY 2002 3

  Personnel News 3

  CRU National Program Awards 3

    Scientific Excellence Award Recipients 4

    Leadership Award Recipients 5

    WMI Administrative Excellence Award 8

  Update on CRU Web 9

In Memory 10

Program Statistics 11

  Projects 11

  Accomplishments and Activities of Federal Unit Staff 12

  Students 15

Unit Pages 17

Honors and Awards 57

Selected Accomplishments 59

  Animal Biodiversity Surveys and Monitoring 59

  Biometrics and Modeling 60

  Ecosystem Management 62

  Environmental Contaminants 64

  Fisheries Management 65

  Game Management 69

  Habitat Management and Restoration 70

Imperiled Species 72

Non-game Species 74

Miscellaneous 75

University Service 77

Courses Taught 77

University Committees and Work Groups 81

Chair/Director Positions 81

Committee and Workgroup Memberships 81

Professional Service and Involvement 85

Editorships 85

Professional Society, Officer Positions 86

Professional Society, Committees 87

Committee Chairs 87

Committee Memberships 88

Memberships on Task Forces, Recovery Teams, Ecosystem Teams, etc. 89

Publications 93

Scientific Publications of Federal Unit Staff 93

Technical Publications of Federal Unit Staff 118

Theses and Dissertations of Unit Students 127

Scientific Publications of Non-student Affiliates 132

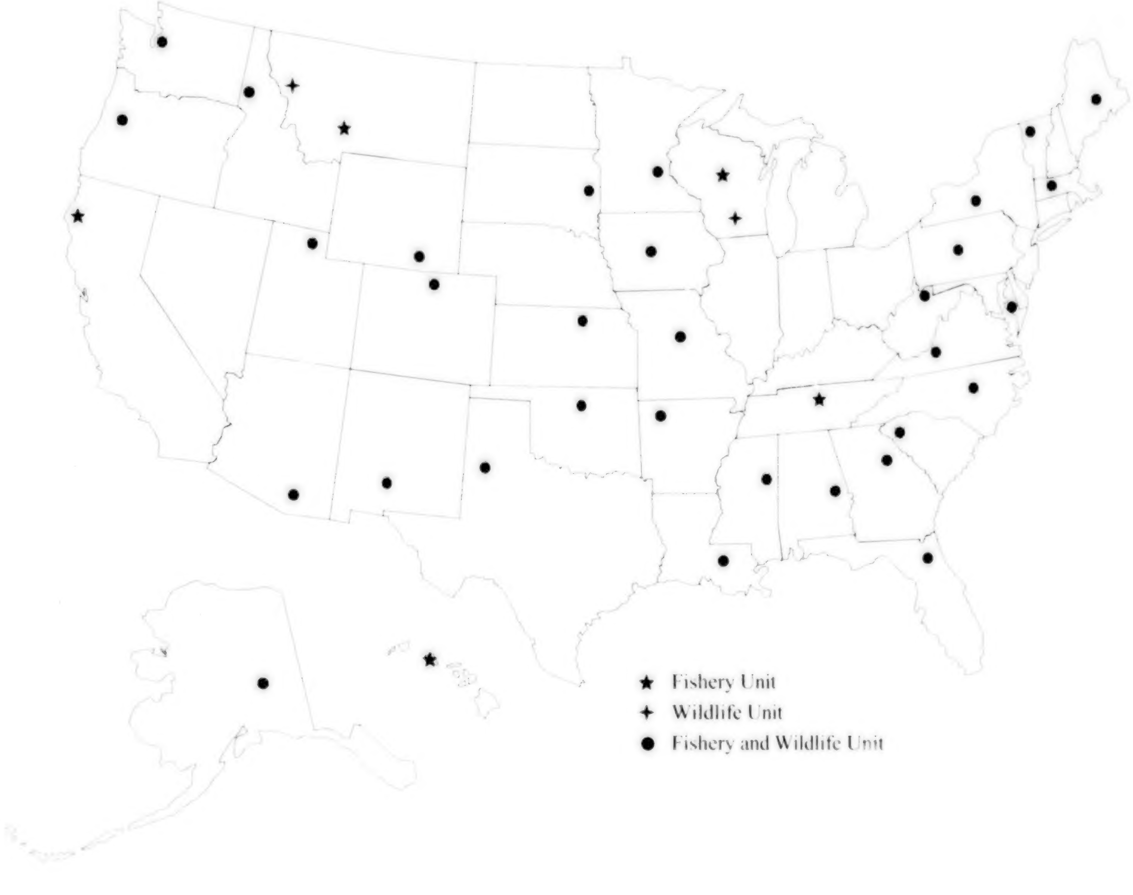
Technical Publications of Non-student Affiliates 136

Theses and Dissertations of Affiliated Students 139

Cooperative Research Units Program

The Cooperative Research Units Program is one of U.S. Geological Survey's (USGS) strongest links to federal and state management agencies. Each unit is a formal partnership among the Biological Resources Division of the U.S. Geological Survey, a State natural resource agency, a host university, and the Wildlife Management Institute. The structure of the program provides Federal and State agencies access not only to Unit scientists, but also to facilities and expertise available at the cooperating universities. Because scientists and university faculty members possess individual interests and areas of expertise, the program collectively embraces a wide array of disciplines related to fish, wildlife, and natural resource management in virtually every type of North American ecological community.

The first Unit was established at Iowa State College, in 1935, by J. Norwood "Ding" Darling. Darling was a visionary who recognized a dire need for biological information, trained wildlife managers, and dissemination of information to management agencies. Darling didn't quit with the establishment of the Iowa Unit, but went on to establish regional Units that facilitated development of a national program. In 1960, the Unit Program was formally sanctioned with the enactment of the Cooperative Units Act (PL 86-686). Today, there are 39 Cooperative Research Units in 37 states.



Cooperative Research Units have a three-fold mission: Education, Research, and Technical Assistance.

Education - Unit scientists teach university courses at the graduate level, provide academic guidance to graduate students, and serve on academic committees. Training of future resource professionals is accomplished through a "hands-on" approach as most research projects are carried out by graduate students participating with and/or under the direction of unit or other university scientists. The Cooperative Research Units Program also sponsors two minority education programs that focus on recruitment, training, research opportunities, and placement assistance for minority students: the Cooperative Fisheries Project at the University of Arkansas-Pine Bluff, and the Native American and Hispanic Program (directed by the Arizona Unit).

Research - Cooperative Unit scientists conduct research that is designed to meet the information needs expressed by unit cooperators. Unit research programs are not base funded, but rather are funded by State, Federal, and non-government agencies to meet their own information needs relating to fish, wildlife, and natural resource management. Collectively, the Program conducts over 1,000 research projects and produces more than 300 scientific publications annually. Units use each individual project as a building block in constructing research programs to provide not only applied science information for management, but also to develop new techniques, scientific theory, and principles at a more basic level. The research programs conducted by units are locally approved, as directed, by the Unit Coordinating Committee overseeing each unit. Research programs and staff expertise differ widely among units, reflecting the needs of local cooperators. The research may be of local, regional, national, or international interest. The Cooperative Research Units Program participates in two major national research and monitoring programs: Gap Analysis Program and Breeding Birds. Multiple unit projects are not unusual and take advantage of the strategic geographic locations of units dispersed across the country, and the differences in expertise among different units.

Technical Assistance - Units provide technical assistance and training to State and Federal personnel and other natural resource managers, as needed. The expertise of the Cooperative Research Unit scientists, cooperating university faculty, and biologists of the cooperating State natural resource agency is made available for this aspect of the mission. Technical Assistance consists of numerous, diverse tasks ranging from participation on a task force or a recovery team to conducting workshops or symposia to writing newspaper articles. Technical assistance is provided as a one-to-one interaction, or to groups through workshops or short courses.

Personnel News

During FY 2002 CRU filled six unit scientists positions. Three of these were filled from within the program. Craig Allen and Al Zale moved into the Unit Leader positions at their units in South Carolina and Montana, respectively. Chris Guy moved from his AUL-F position in Kansas to the AUL-F position in Montana vacated by Al Zale. Three new employees expand the program's breadth of expertise available to Cooperators and partners: Melanie Culver (AZ) and Brian Sloss (WI-F) reported for duty as the program's first conservation geneticists and Christine Moffitt was selected for AUL-F at ID where she will work on salmon and other fisheries issues. Unit scientist positions vacant at the end of the fiscal year include: Alaska, AUL; Maine, AUL-F; Vermont, AUL-F; Wisconsin, AUL-W; Louisiana, UL; South Carolina, AUL-W; and Kansas, AUL-F. Recruitment actions for three of these positions were initiated in FY 2002 (LA, SC, WI-W), and in fact already have been completed in FY 2003.

Congratulations to Dr. Michael Scott, Unit Leader at Idaho, and Dr. Carl Schreck, Unit Leader of the fisheries program at the Oregon Unit for their promotions to the senior scientist level. Mike and Carl join Dave Anderson, Unit Leader at Colorado, as the only program scientists who have been awarded this rank, the highest offered by the DOI. Many other Unit scientists also were promoted this year, further acknowledgment of the work that they are able to accomplish through the state/university/federal partnership of the Cooperative Research Units program.

Unfortunately, we again must report the death of a colleague, Dr. John Moring (AUL-F, ME). John will be greatly missed by his friends and colleagues within and outside of our program (please see "In Memory" section on page 10).

CRU National Program Awards

FY 2002 marked the second year of the CRU National Awards Program. This program recognizes significant accomplishments of Unit scientists in areas of Scientific Excellence, Leadership, and Service. Mike Van Den Avyle (chair), Donna Parrish, Petra Wood, Walt Duffy, and Charles Rabeni served on the award committee for 2002. The committee reviewed all nominations and supporting documents received from Unit scientists, Cooperators, and colleagues. The committee then provided award recommendations to the Chief, CRU. Recipients of awards are listed below for each category.

Scientific Excellence Award Recipients

Hiram Li

Dr. Hiram Li is a Research Fishery Biologist and Assistant Leader at the Oregon Cooperative Fish and Wildlife Research Unit. Dr. Li continues his tradition of productive research on challenging issues having immediate and direct management implications. His work focuses on community ecology of stream fishes, but his research also addresses questions relevant to invasive aquatic species, estuaries, and marine reserves. In the past year, Dr. Li published six refereed scientific papers in prestigious journals, including two in BioScience and one in Ecology. He also submitted a paper that is now in press for American Naturalist and has a recent letter in Science. This work has led to breakthroughs in how to think about community structure, the development of mathematical approaches to modeling, and the development of a novel approach for making management decisions regarding perturbed ecosystems. He has presented decision-making workshops to managers and scientists around the country and is regularly approached to hold additional sessions.

Dr. Li's long-standing record of quality science and its applicability are reflected in his present portfolio of biologically and geographically diverse management-oriented research projects. In the past year he directed projects on topics including effects of exotics on native anurans, effects of marine invaders on native estuarine benthic communities, coastal nekton in the Gulf of Mexico, and adaptive management of bobwhite quail in Kansas. In 2002, Dr. Li received the greatest recognition given by Oregon State University for team research, the James and Mildred Oldfield and E.R. Jackman Foundation Award for Team Research. Also, Dr. Li was appointed by the Governor to the State of Washington's Independent Science Team for Salmon Recovery. His active participation influenced salmon and watershed recovery, and appreciation for his efforts was evident throughout state and federal government.

Daniel Roby

Dr. Daniel Roby is a Research Wildlife Biologist and Assistant Leader at the Oregon Cooperative Fish and Wildlife Research Unit. In the past year, Dr. Roby published a collection of 7 papers in refereed journals; he has averaged 4 publications per year over the last 4 years. However, it is the substance of his work that is particularly noteworthy. Dr. Roby's research program involves a unique blend of wildlife ecology and physiological ecology, with a particular emphasis on foraging ecology and energetics of seabirds and colonial waterbirds . Dr. Roby has creatively employed basic concepts and theories of physiological ecology to help solve problems in management and conservation of natural resources. His research on reproductive energetics has demonstrated that low productivity of seabirds is a reflection of severe constraints on parental ability to allocate energy to the nest site, and he has demonstrated the major impacts on seabird productivity of seemingly minor shifts in prey availability. This approach has provided new insight into recent declines of red-legged kittiwakes in the Bering Sea and pigeon guillemots in the Gulf of Alaska. Dr. Roby's application of bioenergetics modeling to the high-profile issue of avian predation on fish stocks is another major area of research accomplishment. Dr. Roby proposed that predation of juvenile salmonids in the Columbia River could be reduced by relocating the world's largest Caspian tern colony to several restored historic breeding sites. His predictions have proved to be correct, and his management recommendations are frequently cited by policy makers, elected officials, and resource managers at State and Federal levels. These efforts succeeded in resolving a controversial resource management issue between bird conservation groups and those interested in the conservation of endangered salmon stocks.

Brad Griffith

Dr. Brad Griffith is a Research Wildlife Biologist and Assistant Leader at the Alaska Cooperative Fish and Wildlife Research Unit. Dr. Griffith has been a team leader for the USGS science community in the national debate on oil extraction in the Alaska National Wildlife Refuge. His research activities have made major contributions to understanding the effects of land use practices on wildlife populations. Despite many years of research and monitoring, the basis of the debate on whether or not to open a portion of the Refuge for oil development has been dominated by emotion that has polarized the Nation. Dr. Griffith's work has done a great deal to help calm the rhetoric. He has provided scientific perspective and interpretation of research findings for the U.S. Geological Survey, Department of Interior, and interested members of the U.S. Senate and House of Representatives. In particular, his objective presentation of information for the Porcupine Caribou herd, which has become a flagship species of the debate, has gained the respect and admiration of those on both sides of this highly emotional national issue. Based on two decades of multi-agency research and monitoring, Dr. Griffith and his colleagues developed state-of-the-art analytical techniques to estimate climate-induced changes of caribou habitat quality, responses of caribou to habitat changes, and the changes in caribou calving distribution associated with oil development. Empirical relationships were used to develop a quantitative, spatially explicit model used to predict effects of oil extraction activities on habitat quality and reproductive success of the caribou herd.

Leadership Award Recipients

Joseph Hightower

Dr. Joseph Hightower is a Research Fishery Biologist and Assistant Leader at the North Carolina Cooperative Fish and Wildlife Research Unit. In 2002, Dr. Hightower expanded his delivery of research results beyond traditional scientific boundaries by developing creative outreach mechanisms and distributing products to a diverse audience, both professional and public. His efforts with distance learning have provided contemporary information on resource management and quantitative techniques to graduate students and agency biologists at remote locations. These efforts have contributed to outstanding training, technology transfer, public education, continuing education, and improved awareness, protection, conservation, and restoration of natural resources.

With distance learning, Dr. Hightower was among the first faculty at NC State University to fully utilize distance-learning software to offer his course in Quantitative Fishery Management to students and agency biologists at the Center for Marine Science and Technology on the NC coast. Lectures took place on the Raleigh campus, and visual aids, notes, assignments, and exams were made available via a web site. This made it possible for nine students to enroll that otherwise would otherwise have been unable to participate. The final class project was a real-life exercise to perform a stock assessment of the Roanoke River striped bass population, and results were presented on a class trip to a multi-agency meeting of the NC Division of Marine Fisheries, NC Wildlife Resources Commission, and US Fish and Wildlife Service.

In 2002, Dr. Hightower had numerous accomplishments with development of outreach products. He published two articles aimed at non-scientific audiences and featured his research in a video production. Popular articles about dam removal appeared in Tradewinds, a magazine for commercial fishers, and in Habitat Hotline Atlantic, a publication of the Atlantic States Marine Fisheries Commission. His work was prominently featured in a video produced by NC Sea Grant entitled "NC Fishery Resource Success Stories." Dr. Hightower produced a narrated, stand-alone, module about dam removal as a technique to restore fish habitat. It included slides, digital video clips, data figures, and scientific interpretation. He and the US Fish and Wildlife Service distributed this product widely to audiences that may not have otherwise accessed the information. Dr. Hightower, in 2002, presented various aspects of his research findings to nine different audiences, including international scientific conferences, a Commercial Fishing Show, a meeting of the Power Squadron, and over 225 students in elementary and middle schools.

Franklin Percival

Dr. Franklin Percival is a Research Wildlife Biologist and Leader at the Florida Cooperative Fish and Wildlife Research Unit. In 2002, Dr. Percival continued his tradition of providing exemplary leadership and service to the Florida Unit, CRU program in general, and continuing support of Cooperators in the Florida environment. Dr. Percival routinely puts "program" before "self" in his allocation of time and work energy. He is supportive of the daily activities and career development of everyone he works with, including Assistant Leaders, all Unit students, and Unit administrative staff. In recent years he has been instrumental in the establishment of the Southern Adaptive Management Group (alias "the Oak Tree Gang"), which is comprised of employees from the Florida Unit, USGS Florida Caribbean Science Center, Florida Fish and Wildlife Commission, USFWS, and University of Florida. Dr. Percival has unselfishly devoted many hours working with participants in this program to identify productive research directions, find space and other facilities for operation, and recruit scientists to participate in this innovative program. In the past year, Dr. Percival played an important leadership role in the development and hosting of an annual meeting of the IUCN Crocodile Specialist Group - a meeting that attracted over 200 biologists from around the world. This role is reflective of Franklin's long-standing involvement with research on crocodilian ecology and conservation and representative of his style of leadership in all areas.

James W. Wiley

Dr. James Wiley is a Research Wildlife Biologist and Leader at the Maryland Cooperative Fish and Wildlife Research Unit. Dr. Wiley is presented this award because of his leadership in three important areas: mentoring personnel, education of minority and international students, and Cooperator service. Since the fall of 2000, when Dr. Wiley was appointed Leader at the Maryland Unit, he has successfully handled challenges that involved mentoring employees on issues that were sensitive, complex, and emotionally charged. Dr. Wiley listens very well, obtains information necessary to resolve specific issues, and responds to others in a direct and professional manner. Dr. Wiley is strongly committed to education of minority and international students. He has been active with recruiting diverse students into the wildlife and fisheries profession and has worked closely with Federal agencies so that students and agencies are aware of each other's employment needs. Dr. Wiley maintains an active research program in the Caribbean and serves as a mentor of graduate students enrolled in universities located in several Caribbean countries, including Cuba. His efforts provide scientific knowledge about the region and help train scientists that will be leaders of conservation efforts in their native countries.

Dr. Wiley has worked tirelessly to expand working relations among Cooperators of the Maryland Unit. He has worked with the University of Maryland – Eastern Shore to obtain improved laboratory and graduate student space and with the Assistant Unit Leaders to enhance class offerings in support of graduate education. Dr. Wiley has also built working relations with the U.S. Fish and Wildlife Service by serving on several advisory committees and by implementing research of high interest to the FWS refuges in the region. Dr. Wiley's efforts have resulted in a higher profile for the Maryland Cooperative Fish and Wildlife Research Unit in the view of its Cooperators.

Alexander Zale

Dr. Alexander Zale is a Research Fishery Biologist and Leader at the Montana Cooperative Fishery Research Unit. During the last year, Dr. Zale was responsible for negotiating a new Cooperative Agreement for the Unit, hiring a new Assistant Unit Leader (including negotiation of a start-up package), and hiring the new Administrative Assistant. He maintained an active research program by recruiting several new graduate students and publishing scientific results in peer-reviewed journals. Development of the new Cooperative Agreement was challenging because of recent staffing changes with University and State Cooperators and the existence of problems in the old agreement that should have been fixed many years ago. Dr. Zale implemented procedures to strengthen the Unit's connectivity with the State Cooperator by attending the Montana Fish, Wildlife, and Parks Fisheries Division meetings, developing workshops for fisheries biologists, and involving State biologists in research projects. Dr. Zale provided strong leadership within the Department of Ecology at Montana State University. He served as primary reviewer of a full-professor promotion, directed the renovation of the aquatic laboratory and Unit graduate student offices, and led the development of a University document that outlines the expectations of graduate students in the Department of Ecology.

Dr. James Congleton

Dr. James Congleton is a Research Fishery Biologist and Assistant Leader at the Idaho Cooperative Fish and Wildlife Research Unit. This award is presented to Dr. Congleton for his ongoing, effective leadership in a research program that contributes substantially to management of salmonids in the Columbia River basin. His work has repeatedly provided information used by the US Army Corps of Engineers and Bonneville Power Authority to modify the structure and operation large hydropower dams on the Columbia and Snake Rivers. Such modifications, which often cost millions of dollars to implement, have improved downstream passage and survival of juvenile salmon. The direct application of research results in such high-visibility, costly projects is a credit to quality of Dr. Congleton's work. He is effective in this arena because of leadership in defining research that is relevant to managers, conducting the research, and presenting findings in ways to successfully influence policy.

Specific examples of Dr. Congleton's recent research are:

- 1992. Exposure to direct sunlight was stressful for fish confined to shallow water. This led to installation of covers over fish separators at Snake River dams.
- 2002. Stress response of juvenile chinook salmon during barge transportation was elevated in proportion to density of co-transported juvenile steelhead trout. This has led to expanded efforts to separate the two species and to justify the purchase of additional barges.
- 2002-2003. While participating in a work group organized by the Corps of Engineers to develop new approaches to separation of chinook salmon and steelhead smolts, Dr. Congleton proposed development of a high-velocity fish separator. This concept was the only one to proceed through testing and development, and will be put in place when the Lower Granite Dam fish separator is replaced in 2004.

WMI Administrative Excellence Award

The Wildlife Management Institute's Administrative Excellence Award, initiated in 2000, recognizes university personnel that support the efforts of the CRU program. It is not possible to overstate the role that these members of the Unit family play in the day-to-day functional operation of individual Units and the national program and we are grateful to the Wildlife Management Institute for providing a mechanism to recognize their contributions. Annually, the award will recognize up to three university administrative personnel, and provide each with a plaque and a $500 cash award.

Through a national nomination and selection process, two awards were given in FY 2002. Shari Weant (chair), Al Zale, and Rob Manes (WMI) served on the award committee for 2002 that reviewed nominations to establish the eligibility of the nominees as well as make the final recommendations to Rollie Sparrowe (President, WMI). The recipients of the WMI Administrative Excellence Award for 2002 were: Wendy Moore of the North Carolina Unit and Jil Prosciak of the Massachusetts Unit. Congratulations Wendy and Jil!

Wendy Moore
North Carolina

Jil Prosciak
Massachusetts

Update on CRU Web (www.coopunits.org)

During the past 2 years, CRU has developed CRU Web, a web-enabled database and software, to allow entry and retrieval of data at the field and national level. The system was initiated to reduce the number of duplicative data calls and to serve as a permanent database for many of the types of data that are compiled for state and national reports to Cooperators. There are many administrative economies that now can be achieved through the use of this system, and we expect to provide a number of new services resulting from report generating components of the CRU Web. For example, the current report was largely generated from the data entered into CRU Web by each Unit.

In addition to its reporting capabilities, CRU Web is also the home site for the national program on the world wide web. The system serves web pages for each unit based on the information they have entered, but also provides direct links to web pages maintained by the individual units. Lastly, the system is the central repository of CRU data, as well as, administrative and policy guidance to the units.

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Units

IN MEMORY

JOHN RICHARD MORING

BANGOR - John R. Moring, Ph.D., 56, died unexpectedly on May 9, 2002, in Portland. He was born in San Diego, Calif., Feb. 4, 1946, the son of Walter Forman and Lois Griffin Moring. John graduated from Point Loma High School in San Diego, and then received Bachelors of Science degrees in Oceanography in 1968 and Fisheries in 1969, from Humboldt State University, a Masters of Science Degree in Fisheries from Humboldt State University in 1970, and a Ph.D. in Fisheries from the University of Washington in 1973.

Prior to moving to Maine, John worked for the Oregon Department of Fish and Game. Since 1979, he has been employed as the Assistant Leader of the Cooperative Fisheries Research Unit of the U.S. Geological Survey stationed at the University of Maine. At the time of his death he was also a Professor of Zoology at the University. He was a very productive writer, scientist, and teacher. He had a broad knowledge of both marine and freshwater fishes, and was very interested in stream ecology, the effects of forest practices on fish habitat, and tide pool fishes. He aided in the restoration of the Atlantic salmon in the Penobscot River. He was a very dedicated teacher who, since 1979, was the major professor for 34 graduate students, of whom he was very proud. He also served as a member of many other graduate committees. John's research efforts have been acknowledged by his receipt of numerous awards such as the Dwight Webster Award of Excellence from the American Fisheries Society. In addition to other honors from the American Fisheries Society, the National Biological Survey and the U.S. Fish and Wildlife Service also acknowledged the quality of his work. He also received numerous awards for his photography. A member of the American Fisheries Society since 1967, he served as president of the Northeastern Division as well as president of the Fisheries History Section. He was a Certified Fisheries Scientist. He has been a member of the American Society of Ichthyologists and Herpetologists since 1971. In 1995, he became an Elected Fellow of the American Institute of Fishery Research Biologists. He was also a member Sigma Xi. His affiliations included membership in the Western History Association, the Western Writers of America, and the Mining History Association. A prolific writer, John published over 137 scientific papers, as well as over five dozen freelance articles, short stories, newspaper articles, humor pieces and poems, and two non-fiction books. A new non-fiction book is due to be published this coming fall. John loved the American West. In 1995, his book, Arthur Hill: Western Actor, Miner, and Law Officer, was nominated for the Bancroft History Prize. Another book, Men With Sand, was nominated for a Spur Award.
John is survived by his wife of 33 years, Kathleen; two sons, Matthew and his fiance, Lila Abraham; and Samuel and his fiance, Carrie Congleton; his brother and sister-in-law, Peter and Silvija Moring and their daughter, Rita; his brother-in-law, Don Raig; and his loving dog, Lucky. John enjoyed the dear friendship of many very special friends. A memorial service will be held 3 p.m. Tuesday, May 21, 2002, at Brookings-Smith, 133 Center St., Bangor, with the Rev. Robert T. Carlson, pastor of the East Orrington Congregational Church, officiating. Relatives and friends are invited to share conversation and refreshments at the Brookings-Smith Family Center, 163 Center St., Bangor, following the service on Tuesday. Gifts in John's memory may be made to any or the following: the University of Maine for the Black Bear Scholarship Fund, Black Bear Club, 5747 Memorial Gym, Orono, ME 04469-5747; to The Homestead Foundation (of the Western Writers of America), James A. Crutchfield, Secretary/Treasurer, 1012 Fair St., Franklin, TN 37064; or to the Northeastern Division of the American Fisheries Society (for students), attn. Scott Decker, New Hampshire Dept. of Fish and Game, 2 Hazen Dr., Concord, NH 03301.

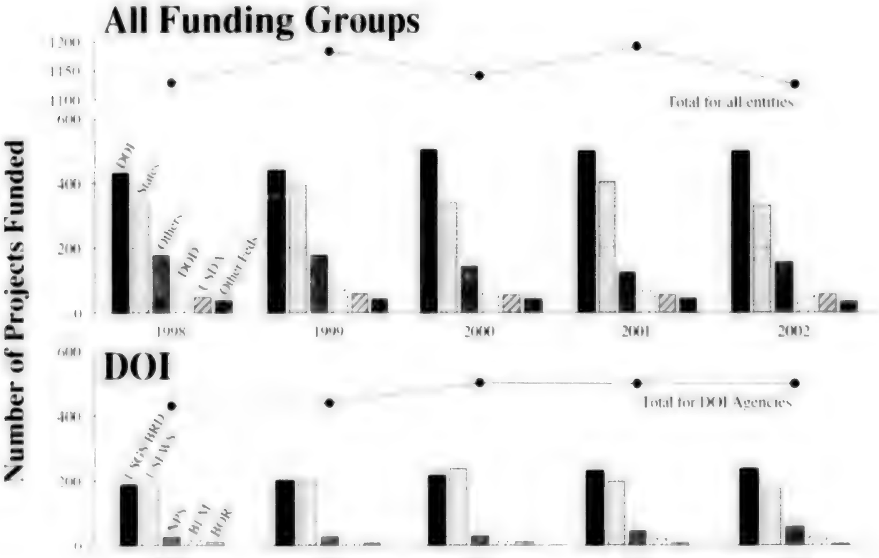
Projects

In FY 2002, Cooperative Fish and Wildlife Research Units were actively engaged in 1000+ research projects (Table 1), completed approximately 200 projects and initiated 125+ new projects. Over thirty agencies, organizations or other entities contracted Unit research services in FY 2002. Sixty nine percent of the projects (by number) were funded by Department of Interior (38%) and State (31%) agencies. The number of projects in FY 2002 were similar to previous years among all funding groups and for DOI bureaus (Figure 1).

Table 1. Number of projects sorted by agencies, organizations, and other entities contracting for research services in FY02.

Agency or organization	Number	Agency or organization	Number
USGS-Biological Resources Division	235	Native American agency	4
Bureau of Land Management	26	Non-governmental Conservation Org.	41
Bureau of Reclamation	5	Other	27
City or County Government	6	Private Industry or Organization	19
Department of Defense	20	State Agencies	330
Department of Energy	5	U.S. Army Corps of Engineers	32
Foreign Government or University	4	U.S.D.A. (other than Forest Service)	11
National Fish and Wildlife Foundation	7	U.S. Environmental Protection Agency	13
National Marine Fisheries Service	6	U.S. Fish and Wildlife Service	175
National Oceanic and Atmospheric Admin.	10	U.S. Forest Service	46
National Park Service	57	U.S. University	38
National Science Foundation	8		

Figure 1. Five year history of project funding for all funding groups and breakdown of DOI funding by bureau.



Accomplishments and Activities of Federal Unit Staff

Unit scientists published 357 scientific, peer-reviewed papers, submitted 122 reports to management agencies, and gave 682 presentations to natural resource professional societies and agencies (Table 2). The number of scientific publications and presentations is high relative to previous years (Figure 2), while reported technical publications are slightly lower. Manuscripts authored or co-authored by Unit scientists were published in more than 130 scientific outlets (Table 3). The large number of outlets reflects the diverse nature of the program's science, as well as its international scope. However, the fact that the science of the program remains solidly based in issues of importance to resource managers is evidenced by the top journal outlets. The largest number of manuscripts were published in four journals that are widely read by resource managers: North American Journal of Fisheries Management (24); Transactions of the American Fisheries Society 23); the Wildlife Society Bulletin (11), and the Journal of Wildlife Management (10).

Table 2. Number of publications and presentations of professional papers with co-authorship by Federal Unit staff or by others affiliated with a Unit in FY 2002.

Author coauthor	Journals, books & symposia[1]	Technical & semi-technical	Papers presented
Federal Unit Staff	357	122	682
Affiliates	69	62	582
Total	414	170	1191

[1] Includes only symposia with recognized publication series such as Transactions of the North American Wildlife and Natural Resources Conference.

[2] Does not include lectures provided as part of seminar series at universities.

Figure 2. Number of publications, presentations and papers presented by federal unit scientists

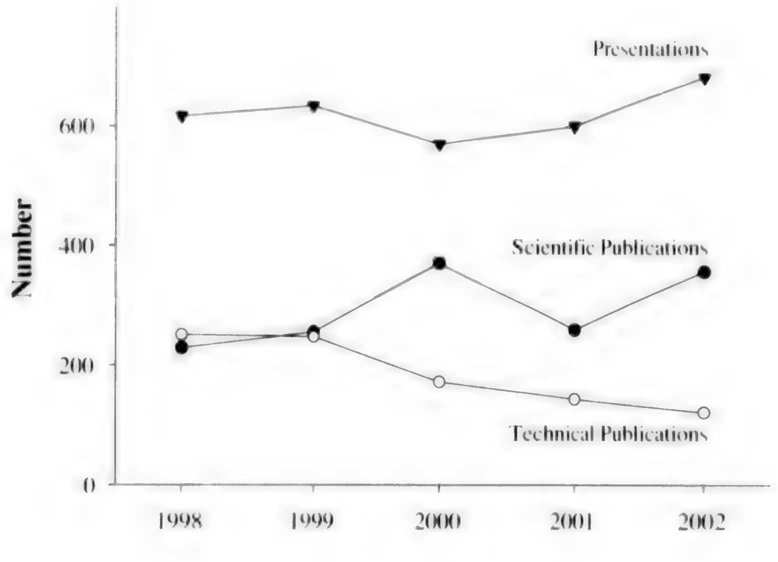


Table 3. Number of publications by federal Unit scientists appearing in each scientific journal

Journal	N
North American Journal of Fisheries Management	24
Transactions of the American Fisheries Society	23
Wildlife Society Bulletin	11
Journal of Wildlife Management	10
Journal of Freshwater Ecology	9
Fisheries	7
American Midland Naturalist	6
Auk	6
Condor	6
Journal of Applied Statistics	6
BioScience	5
El Pitirre	5
Journal of Mammalogy	5
Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies	5
Southwestern Naturalist	5
Ecosystems	4
Forest Ecology and Management	4
Journal of the North American Benthological Society	4
USGS, Biological Science Report	4
American Fisheries Society Symposium	3
Conservation Biology	3
Ecological Applications	3
Environmental Management	3
Journal of Fish Biology	3
Journal of Geophysical Research - Atmospheres	3
Journal of Raptor Research	3
Marine Ecology Progress Series	3
Northeastern Naturalist	3
Prairie Naturalist	3
Aquaculture	2
Behavioural Ecotoxicology	2
Biological Conservation	2
Canadian Journal of Remote Sensing	2
Climatic Change	2
Ecological Modelling	2
Ecology	2
Ecology of Freshwater Fish	2
Environmental Monitoring and Assessment	2
Environmental Toxicology and Chemistry	2
Fisheries Research	2
General and Comparative Endocrinology	2
Herpetological Review	2
Hydrobiologia	2
Intermountain Journal of Sciences	2
Journal of Aquatic Animal Health	2
Journal of Field Ornithology	2
Journal of Range Management	2
Quail V: Proceedings of the Fifth National Quail Symposium	2
Transactions of the Kansas Academy of Science	2
Wetland Journal	2
Wetlands	2

One manuscript was published in each of the outlets below

Agriculture, American Association for the Advancement of Science, American Malacological Bulletin, Annals of the Entomological Society of America, Behavioral Ecology, Boletin del Jardin Botanico Nacional, Bulletin Environmental Contamination Toxicology, Canadian Journal of Fisheries and Aquatic Sciences, Canadian Journal of Zoology, Chemosphere, Copeia, Coral Reefs, Deep-Sea Research, Diseases of Aquatic Animals, Ecological Engineering, Ecological Monographs, Ecological Restoration, Ecosystems & Environment, Envirometrics, Estuaries, Estuarine Coastal and Shelf Science, Fish and Shellfish Immunology, Fisheries Management and Ecology, Fishery Bulletin, Forest Science, Forest Science, Freshwater Biology, Game and Wildlife Science, General and Comparative Endocrinology, Great Plains Research, Human and Ecological Risk Assessment, Human Dimensions of Wildlife, Hydrological Processes, Intermountain Journal of Science, John Wiley & Sons, Chichester, Johns Hopkins University Press, Journal of Agricultural and Urban Entomology, Journal of Arid Environments, Journal of Herpetology, Journal of Plankton Research, Journal of the American Water Resources Association, Journal of Vegetation Science, Journal of Vegetation Status, Landscape Ecology, Life Science, Natural Resource Modeling, North American Bird Bander, North American Journal of Aquaculture, Oecologia, Physiological and Biochemical Zoology, Plant and Soil, Proceedings of the 2nd International Galliformes Symposium, Proceedings Oklahoma Academy Science, Rangifer, Reproduction Supplement - Society for Reproduction and Fertility, River Research and Applications, Rivers, Science Teacher, The Scientist, Transactions North American Wildlife and Natural Resources Conference, Ursus, Vereinigung fur theoretische und angewandte Limnologie, Verhandlungen., Veterinary Radiology and Ultrasound, Waterbirds, Wetlands Ecology and Management, Wildlife Monographs

In addition to the program's record of scientific productivity, Unit scientists provided a multitude of services to professional societies, boards, and committees in FY 2002 (Table 4; also see complete listings in "University Service" and "Professional Service" sections of this report). The breadth of society involvement (Table 5) reflects the diversity seen in the publication outlets. Federal staff held 29 officer level positions and maintained 108 committee memberships in professional societies, held 61 editorships, and reviewed over 2000 papers, proposals, and planning documents;. Federal staff were also actively involved in workshop and extension activities by conducting a total of 52 workshops, symposia and short courses. Lastly, federal scientists taught over 150 graduate level courses to more than 1,700 students (approximately 500 credit hours) and gave 82 guest lectures in university class rooms.

Table 4. Services and activities provided by federal Unit staff during FY 2002.

Services and activities provided	N
Professional society involvement	
Officer positions	29
Committee Positions	108
Memberships	361
Papers reviewed	1,029
Proposals reviewed	908
Planning documents reviewed	100
Workshop and extension activities	
Symposia conducted	1
Workshops conducted	20
Training sessions or short courses conducted	31
Training sessions or short courses attended	62
Public Lectures	71
Memberships on task forces	5
Memberships on recovery teams	11
Memberships on public panels commissions	6
Television programs	14
Radio programs	13
Films	1
Extension publications	9
Newspaper releases	23
Other outreach activities	95

Table 5. A partial listing of societies and the number of federal unit that are active members.

Society	N
American Fisheries Society	49
The Wildlife Society	44
Ecological Society of America	23
Society for Conservation Biology	14
Cooper Ornithological Society	11
American Ornithologists' Union	10
Sigma Xi	10
North American Benthological Society	9
American Society of Mammalogists	8
American Association for the Advancement of Science	7
Wilson Ornithological Society	6
American Society of Ichthyologists and Herpetologists	5
Association of Field Ornithologists	5
Waterbird Society	4
Society of Wetland Scientists	4
American Institute of Biological Sciences	3
American Statistical Association	3
Biometric Society	3
National Shellfisheries Association	3
World Aquaculture Society	3
Society for Conservation Biologists	3
Other society memberships	87

Table 6. University teaching assignments and classroom lectures by Federal Unit staff during FY 2002.

	Semester system	Quarter system
Number of classes taught	145	14
Number of credit hours taught	475	23
Number of students	1524	223

Students

In FY 2002, the Unit program included 774 graduate students and 12 Post-docs (Table 7). Federal Unit staff served as major advisors for 611 students (Unit students) and 10 Post-docs. An additional 163 students had financial or other ties to a unit, but did not have federal staff as their major advisor (Affiliated students). Federal staff also participated on the graduate committees of 500 other students at their host university. Degrees were received by 96 and 34 of the Unit and Affiliated students, respectively (Figure 4). Thirty-four students in the program were supported through cooperative education agreements (Table 8).

Table 7. Number of graduate students and postdoctoral appointees, and degrees granted.

Degree	Unit Students	Affiliated Students
	Number of Students	
Masters	436	117
Doctoral	175	46
Post-doctoral	10	2
Total	621	165
	Number of Degrees Granted	
Masters	66	29
Doctoral	30	5
Post-doctoral	•	•
Total	96	34

Figure 4. Number of graduate students, degrees granted, and students supported through cooperative education agreements in the CRU program for the last five years.

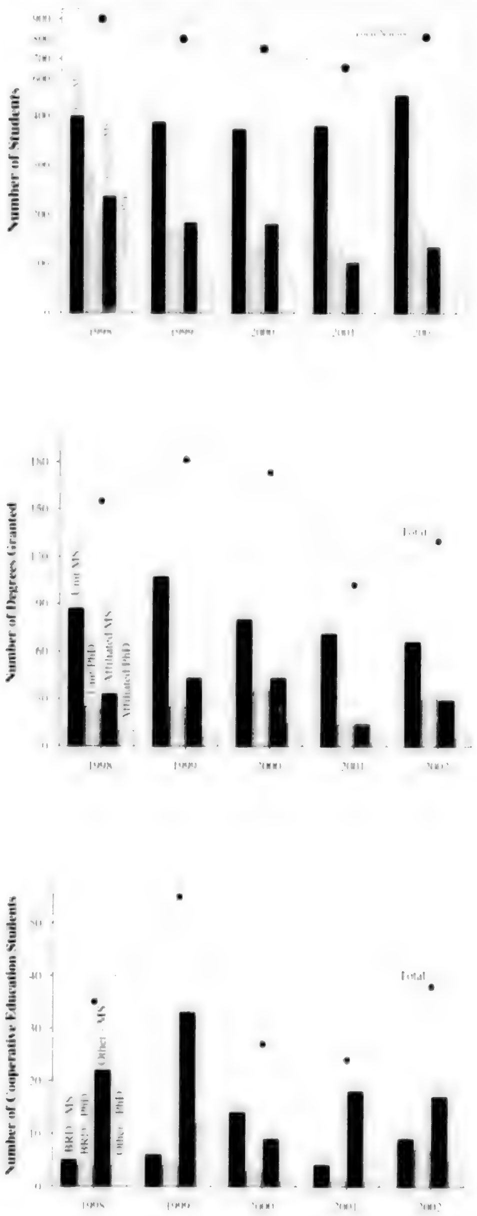


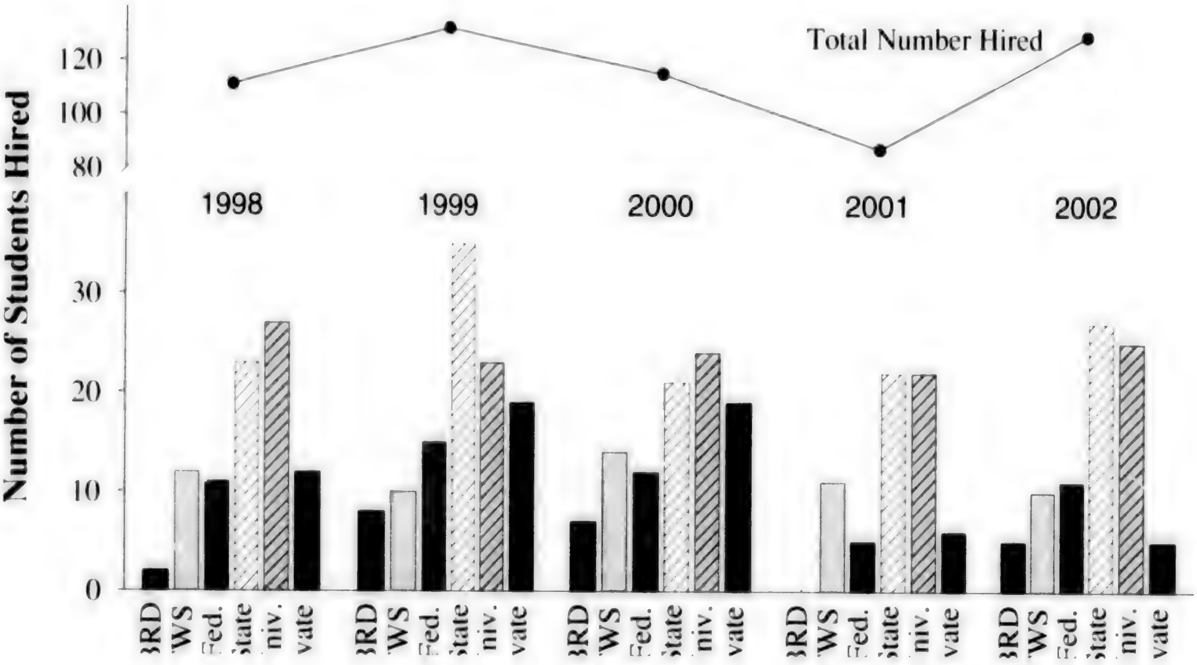
Table 8. Number of students supported by cooperative education agreements and source of support in fiscal year 2002.

		BRD support		Other support	
Minority Status	Gender	MS	PhD	MS	PhD
Non-minority	male	2	4	7	4
Non-minority	female	4	2	7	0
Minority	male	1	1	1	1
Minority	female	2	0	2	0
Totals		9	3	17	5

Overall, the two major employers of FY2002 graduates were state agencies and universities. State agencies and universities were the largest employers of Master's graduates, and universities were the largest employer of Doctoral graduates.

Table 8. Number of Cooperative Research Unit graduate students hired by individual agencies or organizations after completing their degrees in fiscal year 2002.

Agency or organization	MS	PhD	Total
Biological Resources Division	2	3	5
U.S. Fish and Wildlife Service	8	2	10
reau of Land Management	2	0	2
National Park Service	1	0	1
U.S. Forest Service	0	1	1
National Science Foundation	0	1	1
Other Federal agency	6	1	7
State agency	25	2	27
Native Ameerican Agency	3	0	3
Non-govern.Conserv. Org.	4	1	5
Foreign Government	0	0	0
Private Industry	4	1	5
University	14	11	25
Education Continued	8	2	10
Miscellaneous	1	3	4
Unemployed	1	0	1
Unknown	16	6	22
Total	95	34	129



UNIT PAGES

COOPERATIVE RESEARCH UNITS PROGRAM

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Jim Fleming

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Shannon Fennell

Admin. Asst.

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ALABAMA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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ALABAMA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE

Barry Grand *Unit Leader*
Avian population dynamics and habitats, waterfowl and upland game bird ecology, study of marked animal populations. Research involves estimation of vital rates and modeling declining populations with particular emphasis on arctic and subarctic birds.

Elise Irwin *AUL Fisheries*
Aquatic ecology, adaptive management of aquatic systems, landscape ecology of riverine environment, effects of hydrology and limnology on riverine species. Research includes sport fishery management, effects of acid mine drainage, and aquatic Gap analysis.

Mike Mitchell *AUL Wildlife*
Landscape ecology, effects of forest management practices on animal populations and movements. Research includes landscape models of habitat use by passerine birds and black bears in the Appalachian region with particular emphasis on issues of scale.

RESEARCH HIGHLIGHTS

Development of a decision support tool and procedures for evaluating dam operation in the southeastern United States
This project will create a template for future efforts to incorporate decision analysis and adaptive management into the Federal Energy Regulatory Commission re-licensing process by developing a model for implementation of adaptive flow management for Harris Dam on the Tallapoosa River, Alabama.

Using landscape characteristics to model the distribution of Neotropical migrants on a managed forest
A collaborative effort among private forest products industry groups, conservation groups, federal agencies, and two universities to develop a comprehensive model of forest management that incorporates both economic and ecological considerations. This portion of the study is focused on using landscape characteristics to predict presence/absence of migratory birds in industrial forestlands.

Gap analysis for Alabama
Alabama spans five physiographic provinces from Coastal Plain through Appalachian Plateau. Gap analysis is directed towards identifying native animal species and natural communities that are underrepresented in conservation efforts and provides vital information to conservation agencies on the distribution and protection of imperiled animals and habitats.

Aquatic Gap: Regional Analysis of Biodiversity in the ACT/ACF Basins
This project is developing probabilistic models using historic and current data on the distribution of aquatic animals in the Alabama-Coosa-Tallapoosa and Apalachicola-Chattahoochee-Flint River basins towards a decision support system for resource managers.

Modeling the recovery rates of avian populations
The goals of this project are to identify available data on vital rates of selected species of artic water birds, identify and develop methods for modeling their recovery from catastrophic mortality events, and provide natural an easy to use, well-documented modeling tool.

Effects of growing season prescribed fire on productivity and survival of northern bobwhite populations
The objective of this research is to determine the effects of controlled growing season fires on the productivity, survival, and growth rate of bobwhite populations in the longleaf pine ecosystem.

Alaska Cooperative Fish and Wildlife Research Unit

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University of Alaska Fairbanks
Alaska Department of Fish and Game
Wildlife Management Institute
U.S. Geological Survey
U.S. Fish and Wildlife Service

Joseph Margraf *Unit Leader*
Population and community ecology, trophic interactions, and bioenergetics of freshwater and estuarine fishes

David McGuire *AUL Ecology*
Ecological modeling, spatial and temporal analysis of ecosystem dynamics, role of terrestrial ecosystems in the earth system, response of terrestrial ecosystems to global change

Abby Powell *AUL Wildlife*
Conservation biology, avian ecology, endangered species biology and management. Research focuses on developing strategies for both population- and ecosystem-based conservation.

Brad Griffith *AUL Wildlife*
Habitat and nutritional ecology, stochastic population processes, endangered species management planning, remote sensing, landscape processes

Landscape Analysis of Moose Distribution Relative to Fire History in Interior Alaska

Moose (*Alces alces*) are a critical component of ecosystems in interior Alaska, USA, as well as being important for subsistence and sport harvests. Fire is the dominant disturbance in interior Alaska and plays a critical role in forage production for moose. National wildlife refuges in interior Alaska play an important role in both the management of wildland fire and subsistence resources and are tasked with developing refuge fire management plans and addressing federal subsistence proposals, many of which concern moose. Recent research on large herbivores indicates that large-scale phenomenon, such as patch size, shape, and configuration, play a major role in determining the spatial distribution of animals, but how the age and juxtaposition of fire affect the density of moose on the landscape scale is poorly understood. Such data are necessary for understanding the effects of large-scale disturbance on the animals that rely on such habitats. The objectives of this study are to analyze the distribution of moose in interior Alaska in relation to spatial data on vegetation and other topographic features including the age and configuration of burns. These analyses will provide important insights for managing wildland fires and moose, thereby promoting understanding of the role of fire on ecosystems in interior Alaska.

Declining Sea Duck Populations in Alaska

Objectives are to identify population parameters, identify migration and wintering habitats, and document predators that may be contributing to the decline of eider populations in Alaska.

Arizona Cooperative Fish and Wildlife Research Unit

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Signatory Cooperators
University of Arizona
Arizona Game and Fish Department
Wildlife Management Institute
U.S. Geological Survey
U.S. Fish and Wildlife Service

Scott Bonar *Unit Leader*
Fisheries Management, Fish Ecology, Native-Nonnative Species Interactions, Desert Fish Conservation, Standardized Sampling Methods, Biopolitics. Primary research focus is on methods to reduce impacts of nonnative fishes on native species.

Melanie Culver *AUL Fisheries*
Research focuses on using molecular genetic techniques in free ranging populations to examine questions of taxonomy, relatedness, paternity, species identification, gene flow and implications for conservation and management

Courtney Conway *AUL Wildlife*
Endangered Species Conservation, Ornithology, Behavioral Ecology, Avian Life History Evolution. Primary research interests include standard sampling programs for rare and endangered birds, and examining effects of land-use practices on non-game birds.

Research Highlights

Relative Impacts of Nonnative Aquatic Predators on Native Fishes in an Arizona River

Control of introduced fishes in rivers is extremely costly and often ineffective. Methods to identify where and when most impacts occur on native species would (1) allow managers to focus control efforts on those species, size classes, habitats, and times of year where most of the impacts are occurring for cost-savings and increased effectiveness of native-fish recovery efforts, and (2) reduce impacts to those introduced sportfishes which may contribute to valuable fisheries, but may have little impact on natives. We are estimating which introduced fish species and size classes have the most impact on native fishes in the Verde River, Arizona by habitat and time of year using bioenergetics techniques.

Development and Field Testing of Survey Methods for a Continental Marsh Bird Monitoring Program in North America

Populations of many species of marsh birds are thought to be declining in North America; however, we currently lack effective monitoring programs to adequately estimate trends in their populations. We are testing survey methods at U.S.F.W.S. Wildlife Refuges across the United States with the primary goal of developing a marsh bird monitoring program for North America. This protocol will include everything from survey route selection and point placement to field methods and data forms.

Characterizing Gene Flow Among Populations of Black Bear in Arizona.

Black Bear habitat in Arizona is becoming increasingly fragmented, which may interrupt migrations and gene flow among populations. We are comparing the connectivity among current black bear populations to that among historical populations using molecular markers to estimate gene flow among groups. Genetic information is being obtained from field and museum specimens. This information will be useful for managing black bear habitat in Arizona.

Minority Student Training Program

In 1988, the Arizona Cooperative Fish and Wildlife Research Unit initiated the Minority Training Program. The goal of this program is to support minority undergraduate students in obtaining B.S., M.S. or Ph.D. degrees in natural resources management and continue into successful careers in the resource management field. The program has included students of Native American, Asian, Hispanic, and African American descent. The program encompasses all areas in the School of Natural Renewable Resources – fisheries and wildlife, rangeland, watershed, and landscape studies. Student graduates of the program are employed as biologists and managers across the United States in Federal, State, and Tribal Agencies, and the private sector.

ARKANSAS COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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UNIVERSITY OF ARKANSAS
ARKANSAS GAME AND FISH COMMISSION
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

David Krementz *Unit Leader*
Avian ecology, population dynamics, American woodcock, webless game birds, waterfowl, forest management impacts on passerines. Research involves a combination of observational and field experiments to understand harvest strategies and habitat management on individual species or guilds.

Daniel Magoulick *AUL Fisheries*
Aquatic ecology, factors affecting population and community dynamics of freshwater fish and invertebrates. Emphasis has been on the role of disturbance in structuring communities, the relative influence of abiotic and biotic in stream ecosystems, impacts of introduced species, and conservation of biodiversity.

Bill Thompson *AUL Wildlife*
Population estimation and monitoring, survival estimation of marked animals, and modeling wildlife-habitat relationships. Emphasis has been on designing field studies based on statistically defensible methods for estimating population parameters and applying information-theoretic approaches to modeling ecological data.

Le Conte's Sparrow, Clay County AR.
(photo by Robert Doster)

RESEARCH HIGHLIGHTS

Fall migration ecology of webless game birds and shorebirds through the Lower Mississippi Alluvial Valley

Objectives are to estimate migration rates, document migration routes and phenology, and document habitat use. Fall in the Lower Mississippi Alluvial Valley is a time of limited water and hence wetland availability and wetland management decisions are being made with minimal or no data. We are conducting a series of studies to gather baseline data to help land managers make more informed decisions.

Short-term responses of grassland bird populations to haying in northwest Arkansas

Objectives are to evaluate short-term effects of early-season (mid-May) and mid-season (mid-June) haying operations on abundance and nest success of grassland birds in fescue/Bermuda grass pastures in the Wedington Unit of Ozark National Forest and surrounding areas in Northwest Arkansas during 2002-2003.

Evaluation of a mark-resight technique for estimating white-tailed deer abundance in Arkansas

Objective is to evaluate a mark-resight method for estimating white-tailed deer numbers for possible use by the Arkansas Game and Fish Commission to intensively monitor deer population trends within select areas of Arkansas.

Factors Affecting Migration and Recruitment in Headwater Fish Assemblages of Buffalo National River

Objectives are to determine how anthropogenic and natural barriers affect fish movement, the seasonal fluctuations in fish species composition, relative abundance, and migration patterns at the habitat, reach, and watershed scale, and how larval fish drift rates relate to recruitment at multiple spatial scales.

Influence of land use patterns on fish-habitat relationships at multiple spatial scales

Objective is to determine the influence of land use, geomorphology, and hydrology on water quality and fish assemblage structure in the Buffalo National River watershed of Arkansas.

California Cooperative Fishery Research Unit

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California Department of Fish and Game
U.S. Geological Survey

Walter Duffy *Unit Leader*
Ecosystem energetic processes, the ecology of Pacific salmon, watershed restoration and wetland ecology.

Margaret Wilzbach *AUL Fisheries*
Ecology and conservation of anadromous and resident salmonids; stream ecology; watershed restoration.

Research Highlights

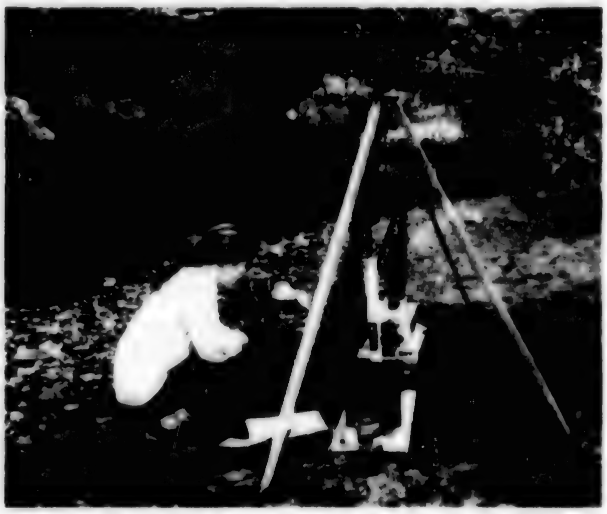
Demographics of coho salmon in northernCalifornia streams of varying habitat quality.
Objectives are to document population size, growth, survival and life history variation in coho salmon from streams having different disturbance regimes. Determining how coho salmon populations respond to different habitat quality and annual climate variation will be used in recovery of this species in California.

Composition of suspended load as a measure of stream health.
The objective is to establish the relative importance of size-specific, inorganic versus organic components of the suspended load in influencing stream health, as reflected in the efficiency of growth of juvenile salmonids and their invertebrate food base. Historically, physical scientists, concerned with the deleterious role of suspended sediments, have discarded data on organic fractions of the suspended load, while stream ecologists, focused on the beneficial role of seston as a food resource, have discarded information on mineral fractions. This research attempts to bring both components together to provide a greater understanding of sediment dynamics as it affects stream health and reflects watershed condition.

Predicting prey availability for stream/river salmonids.
The objective is to develop a protocol for predicting the suitability of the invertebrate prey base of a given stream to support the growth of stream salmonids. Specifically, we are testing the prediction that the ratio of behavioral to accidental drifting invertebrates is correlated with salmonid growth, and comparing the change in ratio of behavioral:accidental drifters among stream sites differing in productive capacity.

Developing biological monitoring protocols for watershed restoration in coastal California.
Objectives are to develop and test protocols for measuring a biological response to watershed restoration activities in coastal California rivers. Emphasis is being placed on developing protocols for monitoring Pacific salmon and steelhead. Protocols will be peer reviewed, then incorporated into a monitoring program being developed by the California Department of Fish and Game.

Stream ecosystem response to enhanced light and introduction of salmon carcasses.
The objective of this collaborative (unit scientists, USFS, and the timber industry) field experiment is to evaluate the relative effects of increased light together with nutrient enhancement from salmon carcasses and riparian litter on: a) salmonid growth and b) the structure of the food web pathways that support salmonid production. To develop a truly successful adaptive management for salmonid recovery, the relative impacts of various manipulations resulting in increased salmonid growth, and the cause and effect relationships driving them, need to be detailed. This experimental study in the Smith and Klamath River basins of northern California is aimed at establishing the necessary foundation for stream reach to watershed scale management to produce increased salmonid growth.



Graduate student Heather Ambrose making measurements of primary production. Heather was awarded a departmental scholarship for her scholastic achievements in Spring 2002.

COLORADO COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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COLORADO DIVISION OF WILDLIFE
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U.S. GEOLOGICAL SURVEY

David Anderson *Unit Leader*
Distance sampling theory and applications (line and point transects, trapping webs), analysis and inference from bird banding data, capture-recapture sampling and analysis (open and closed models), survival experiments, population modeling (hypothesis testing).

Eric Bergersen *ACL Fisheries*
Fish habitat management, fish population dynamics, whirling disease.

Kenneth Burnham *ACL Wildlife*
Statistical theory and methods and data analysis for wildlife research, analysis of animal marking studies, design of wildlife and fisheries studies, distance sampling theory and data analysis, information-theoretic model selection.

RESEARCH HIGHLIGHTS

Whirling Disease
Salmonid whirling disease is perhaps the most challenging management problem facing trout managers in Colorado and elsewhere in the West. With the arrival of WD in Colorado, the Unit began a series of studies designed to understand the etiology of the disease—why was it a problem in some areas and not others—and what factors influenced its severity. The role habitat played in the disease was the clear focus of our effort. As we progressed in this arena we also began to look for management options that might help to stem the spread and severity of the disease. This led to several studies dealing with possible drugs that might fill this need. This work is ongoing and looks promising. We are working closely with USGS hydrologists in developing stream models designed to predict flushing flows needed to mobilize the fine sediments associated with Tubifex habitat. Tubifex is an aquatic worm that is the intermediate host for the parasite that causes whirling disease. It appears quite possible that regulated flows might in some areas be used as a management tool for removing Tubifex habitat from highly infected reaches and thus reduce the incidence of the disease in selected streams where this option is possible. We are expanding our present facilities to allow further drug testing as well as working with resistant strains of trout and their possible hybrids. We are also evaluating how this disease manifests itself in a wild self-sustaining population of Greenback cutthroat trout as part of the Greenback recovery program. Our goal is to assess the risk of this disease to this native trout species.

Northern Pike
Close behind whirling disease in importance to fishery managers is the presence of northern pike in Colorado trout lakes. While some of these introductions were intentional on the part of the Colorado Division of Wildlife, most were not, and as a result, many major trout fisheries in the state now have thriving populations of northern pike, much to the detriment of the trout populations. Our basic objectives are to determine how and why some trout lakes become pike lakes and to understand the population dynamics associated with this transition. Armed with this information, we hope to provide managers with possible management options that will eliminate or reduce the problem.

OTHER UNIT HIGHLIGHTS

David Anderson, Ken Burnham and CSU FWB faculty member Gary White co-instructed a 5-day international workshop June 3-7, 2002, on the CSU campus, titled "Analysis of Encounter Data from Marked Animal Populations." This was an intermediate level workshop; attendees needed previous experience with CR type data and models. There were 37 participants from 4 countries.

Ken Burnham was presented the Cooperative Research Unit Science Excellence Award at the February 5, 2002, CRU All Hands Meeting in San Antonio, TX. This award is an annual award given to individuals within CRU who make outstanding contributions to science.

Burnham, K. P., and D. R. Anderson. 2002. Model selection and multimodel inference: a practical information-theoretical approach (2^{nd} edition). Springer-Verlag, New York, NY. 488pp. The second edition of this book with (nearly) the same title is a much-revised version of the 1998 edition. This book has 135 additional pages, a new chapter, 140 new references, an important new result connecting Bayesian methods to information-theoretic methods, and 7 new examples. The text has been largely rewritten and boxes now highlight the more important formulae and technical points.

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FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
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U.S. GEOLOGICAL SURVEY

Franklin Percival *Unit Leader*
Wildlife Biologist--Wetlands wildlife ecology emphasizing effects of habitat alterations on population ecology. Recent work on adaptive management, team research, and applications of unmanned aerial aircraft in wildlife conservation

Ray Carthy *AUL Wildlife*
Wildlife Biologist--Coastal and wetlands ecology, endangered species, herpetology. Physiological, reproductive and behavioral ecology, especially of marine turtles. Emphasis on effects of habitat degradation on different life history stages and development of effective conservation measures.

Wiley Kitchens *AUL Ecology*
Wetland Ecologist - Ecosystem restoration/conservation spanning landscape/ecosystem to population level. Include GIS and modeling within the disciplines of hydrology, limnology, plant ecology, community/population biology.

RESEARCH HIGHLIGHTS

Monitoring Floral and Faunal Succession Following Alternative Habitat Restoration Techniques in a Large Florida Lake

The littoral reach of Lake Tohopekaliga in central Florida renowned for its largemouth bass fishery, has become excessively overgrown with nuisance vegetation and subsequent sediment (muck) accumulation. Net result is a decline in fishery and wildlife habitat, water quality, and recreational access. Extreme drawdowns, mechanical removal (scraping) of muck, and aggressive herbicide application have been implemented. Sampling efforts are designed to monitor responses in vegetation succession and wildlife communities at a) whole-lake scale, to detect changes in distributions or trends for undeveloped shorelines, and b) treatment site level, to detect differences in the responses of these communities to scraping vs. herbicide applications or both combined.

Everglades Alligator Production in Marsh Interior and Canal Habitats.

This project addressed effects of Everglades landscape decompartmentalization via proposed canal removal on alligator population ecology at Loxahatchee NWR. High clutch mortality, small pod size, and overall low mean hatchling survival in canal habitats resulted in negligible production in canal habitats. Canals appeared to be population sinks for alligators because canal alligators did not contribute a significant number of hatchlings to the greater population. Perhaps canal adult densities are sustained by immigration of adults from the interior and high adult survival. Assuming LNWR is an appropriate model, canal removal may not affect the production rate of the Everglades alligator population.

Developmental habitat use by juvenile sea turtles in the northern Gulf of Mexico.

This project is examining near shore habitat use by juvenile sea turtles in a coastal bay along Cape San Blas, Florida. The bay has recently been established as a crucial developmental habitat for juvenile sea turtles, when approximately 400 juveniles were stranded during a cold-stunning event (the largest event of its kind ever documented). Netting and radio/sonic telemetry are being used to assess population numbers, species, size-classes, seasonal variation in species/size class composition, and habitat preferenda of sea turtles within this bay. This information will not only provide critical information on sea turtles in the rapidly developing Florida Panhandle, but will also provide for a better understanding of juvenile sea turtle dispersal throughout the entire Gulf of Mexico.

OTHER UNIT HIGHLIGHTS

Mr. Hardin Waddle, entering PhD student working collaboratively with Unit and USGS Florida Carribbean Science Center, was awarded the prestigious University of Florida Alumni Fellowship.

Dr. Margaret Lamont (PhD, 2002) is working as a biologist at the Cape Cod National Seashore where she will continue her research interests in coastal ecosystems.

Mr. Matthew Chopp (MS, 2003) accepted a position at Biologist II with the Florida Fish and Wildlife Conservation Commission in Inverness, FL.

GEORGIA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Cecil Jennings *Unit Leader*
Ecology, population dynamics, life history, and management of economically and ecologically important fishes in rivers and estuaries. Also involved with research on Caribbean reef fish and fisheries.

Jim Peterson *AUL Fisheries*
Stream fish ecology with an emphasis on quantifying the effects of physical and biotic factors on stream fishes at multiple scales. Also, evaluating fish collection techniques, developing sampling strategies for endangered species, and quantitative decision modeling.

Michael Conroy *AUL Wildlife*
Wildlife Ecology and Management, Avian and Mammalian Population Dynamics, Biostatistics, Adaptive Resource Management

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RESEARCH HIGHLIGHTS

Development of an Integrated, Adaptive Management Protocol for American Black Ducks

Adaptive resource management is being explored as a means of managing American black duck (*Anas rubripes*) populations in the face of uncertainty about factors that may be influencing population dynamics of this species, notably harvest and competition from mallards (*Anas platyrhynchos*). For more details see: http://fisher.forestry.uga.edu/blackduck/

Development and evaluation of basin planning tools for Lower Flint River Basin, Georgia.

This project will develop spatially explicit simulation models of hydrologic and fish community response to land use change and water development in the Lower Flint River Basin, Georgia. These, in turn, will be used to create quantitative decision tools for planning management and conservation activities.

Assessment of the reproductive status of striped bass, *Morone saxatilis*, in the Savannah River Estuary

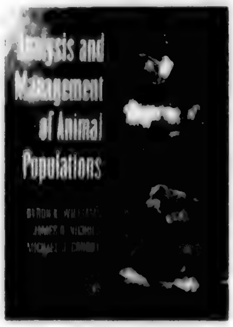
Questions regarding the maturational status and fecundity of adult striped bass in the Savannah River Estuary have arisen because of an increase in number of fish and the continued low numbers of egg. This project developed a non-lethal method (ultrasonic imaging) for determining gender and estimating fecundity. Study results suggest that egg maturation was progressing normally and that the fecundity of striped bass in the Savannah River Estuary was comparable to that seem in striped bass from neighboring river systems. The scarcity of striped bass eggs was attributed to the low numbers of large (> 900 mm TL), highly fecund females in the population.

Development and Application of Habitat Models for Black Bears in Central and Southeast Georgia.

This study focuses on estimating home ranges and habitat use and preference by black bears in the central Georgia population of black bears (*Ursus americanus*). Bears are being radio marked starting in spring 2003, and telemetry data will be used to construct and validate habitat prediction models for use in harvest management and conservation decision making. For more details see: http://coopunit.forestry.uga.edu:8080/unit_homepage/Conroy/projects/dtml/bear1

OTHER UNIT HIGHLIGHTS

Mike Conroy is coauthor (with Ken Williams and Jim Nichols) of *Analysis and Management of Animal Populations*, a new synthesis of population modeling, parameter estimation, and resource decision making, published in 2002 by Academic Press He also authored Wildlife Monograph 150: *Identification and Synthetic Modeling of Factors Affecting American Black Duck Populations* with Mark Miller and Jim Hines.



For more details on Unit projects see: http://coopunit.forestry.uga.edu:8080/unit_homepage

HAWAII COOPERATIVE FISHERY RESEARCH UNIT

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HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES
U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE

James Parrish *Unit Leader*
Ecology of nearshore tropical marine systems, particularly coral reef systems. Emphasis on quantitative assessment of fish habitat and trophic relationships and small-scale fisheries

Charles Birkeland *AUL Fisheries*
Coral reef management: understanding the basis for recovery of degraded coral reefs. Emphasis on how the coral reef ecosystem is affected by overfishing and by excess nutrient input, with focus on biological characteristics and life histories of targeted coral reef species and the nature of ecosystem processes of coral reefs.

RESEARCH PROGRAM

Major areas of research for the Unit center on the ecology of the diverse coastal marine communities of Hawaii and the U.S. Pacific, and on the multispecies fisheries that they support. Important habitats and benthic resources include extensive coral reefs (e.g. the new Northwestern Hawaiian Islands marine reserve). Emphasis in these studies is on (1) understanding how healthy reefs can be maintained and provide important habitat under pressure from human impacts and insults such as climatic warming and disease, and (2) understanding the feeding and habitat interactions and trophic relationships that are important to maintenance of benthic demersal animal communities and the fisheries that they supply.

The Hawaii Unit has conducted major studies on habitat and trophic ecology since 1979, including trophic and habitat work on the introduced blueline snapper and some co-occurring shallow-water native species and on several native species taken together in the deep-water handline fisheries of Hawaii and the Marianas; the major, 4-year, multi-island trophic study of the Northwestern Hawaiian Islands nearshore fish communities; the 4-year study of the marine ecology of a leeward coastal reef tract on Hawaii Island and its fisheries; the multi-year experimental study of the effects of predation on fish community structure at Midway; and system studies over several recent years in north shore Kauai estuaries and bays. The Unit will continue to perform major research studies to enhance the basis for fishery management in the state.

The emphasis on whole communities of fishes is broadening further to an ecosystem approach. Pacific islanders lived on small landmasses and employed a traditional holistic approach to resource management. Ahupuaa is the Hawaiian concept of land and water management by watershed from the hills through shallow coastal waters. Hawaiians traditionally took a holistic approach similar to what is now called Marine Protected Areas (MPAs). The Unit program is expanding to assess the effects of management by MPAs and ahupuaa on ecological processes in contemporary ecosystems.

In a major current project, Unit people are assessing movement, behavior and habitat utilization of a demersal snapper species introduced to Hawaii from French Polynesia in 1955 and the important native demersal fishery species occupying the same habitat. A major objective is to determine the degree of overlap in resource use and detect any overt displacement behavior, in order to assess the potential for competition between the alien and native species. The trophic system of these and other species will be studied in a project beginning soon to assess the potential for competition for food resources and for direct predatory interactions.

Another focus is to assess the effects of MPAs at the level of ecosystem processes. Numerous studies have verified that fish stocks increase in biomass and body size in MPAs, but studies are lacking to determine whether this also leads to changes in rates of recruitment and survival of juvenile corals, changes in algal abundance and composition, and changes in substratum stability and rates of bioerosion. These processes are being tested by field experiments.

The National Park Service is seriously concerned with responding to extensive bleaching and mortality of corals from increased seawater temperatures brought about by global warming. The Unit is assisting them by doing field experiments in a park in American Samoa and laboratory experiments at the University of Hawaii to determine the rates of acclimation, acclimatization and adaptation of Pacific corals to differing rates of increase in water temperature. Results of Unit field experiments suggest that predation strongly affects the distribution of coral populations. This has led to inclusion of predation studies to this project.

IDAHO COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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IDAHO DEPARTMENT OF FISH AND GAME
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U.S. FISH AND WILDLIFE SERVICE

Michael Scott ***Unit Leader***
Landscape approaches to conservation biology, conservation and ecology of Hawaiian forest birds, estimating bird numbers, the recovery of endangered species and identification, selection and design of conservation areas, assessment of comprehensiveness of conservation area system in the U.S.

Christine Moffitt *AUL Fisheries*
Biology, health and management of anadromous fish in captivity and in the wild. Research emphasis includes aquaculture chemical efficacy and approval studies, understanding host-parasite relationships, & investigations of interactions between cultured & wild fish, &fisheries history.

James Congleton *AUL Fisheries*
Physiological ecology of migrating juvenile salmonids (smolts). The primary focus is on changes in the physiological status of smolts migrating through the series of hydroelectric projects on the Snake & Columbia Rivers, and possible consequences for survival.

Gerald Wright *Biologist*
Large mammal habitat use, food habits, and behavior in parks and protected areas.Wildlife visitor interactions in national parks. Long-term land use & resource change & disturbance factors in arid & semi-arid regions. Landscape approaches to preserve planning

RESEARCH HIGHLIGHT

Recovery of Endangered Species
Objectives are to identify characteristics of successful recovery efforts through retrospective analysis of past recovery actions, limiting factors and ecological characteristics of endangered species.

Changes in physiological condition and performance capabilities of juvenile salmon during migration through the Snake-Columbia River Federal Hydropower System
Objectives are determine the effects of extended travel time through the Columbia River hydroelectric system in energy reserves and blood chemistry, and on performance capabilities such as swimming stamina and ability to regulate blood electrolyte concentrations in sea water.

Moose habitat use and food habits in the riparian willow communities of the Colorado River drainage, Rocky Mountain National Park.
Objectives are to determine the distribution and impact on willow communities of an expanding moose population and their dietary overlap and competition with an abundant Rocky Mountain elk population.

Development of empirical models of *Myxobolus cerebralis* to predict risks for populations of fish across river drainages.
Objectives are to build, test and refine models to describe the relationship of landscape level variables and observed infections of salmonid whirling disease in an important Idaho river drainage.

OTHER UNIT HIGHLIGHTS

Theodore Bjornn - Passed away 11/3/01 after a courageous battle. Ted was a Professor in the Fish and Wildlife Dept., Leader of the Idaho Fisheries Unit (1968- 1986), and Asst. Leader of the Idaho Coop Research Unit (1986-2001) he was known throughout North America as a leading expert on steelhead and trout. Ted mentored more than 60 graduate students and played a large role in shaping management policy for trout and anadromous fish in the Pacific Northwest.

Gerry Wright is editor for the *Natural Areas Journal.*

Katherine Strickler (PhD student of Dr. Scott) was awarded a $10,000 scholarship from Anheuser-Busch & the Nat'l Fish & Wildlife Foundation.

J. Michael Scott teamed up with two biologists to publish a new book on the evolution, conservation and decline of Hawaiian birds. ***Evolution, Ecology, Conservation and Management of Hawaiian Birds: A Vanishing Avifauna*** is a scientific monograph in Studies in Avian Biology that includes 35 peer reviewed papers written by bird experts from around the world that provides a comprehensive assessment of the status of Hawaiian endemic birds.

J. Michael Scott teamed up with coeditors to publish a new book on ***Predicting Species Occurrences: Issues of Accuracy and Scale.*** An assessment by more than 60 authors on the strengths and weaknesses of current efforts to predict spatial & temporal occurrences of plants and wildlife.

IOWA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

David Otis *Unit Leader*
Population biology and development and evaluation of quantitative techniques for applications in field ecology. Projects include field studies of population dynamics, statistical analysis techniques, and modeling and simulation of population processes.

Clay Pierce *AUL Fisheries*
Growth, population dynamics, habitat, and community relationships of fish in river, lake and reservoir environments. Projects include work on Iowa rivers & streams and Aquatic Gap Analysis.

Rolf Koford *AUL Wildlife*
Avian population dynamics in relation to restored habitats and landscapes. Projects include examinations of grassland birds and dabbling ducks.

RESEARCH HIGHLIGHTS

Grassland bird response to habitat restoration and landscape effects on bird abundance

Restoration of wildlife habitat in Iowa's highly fragmented landscape has become a priority for wildlife management agencies. Studies have been undertaken to examine population density and reproductive success of birds in two habitat complexes in northern Iowa and in a Bird Conservation Area in southern Iowa, and to quantify local and landscape variables that affect bird abundance throughout the Prairie Pothole Region.

Wildlife response to a wind farm in northern Iowa

Wind farms have become a popular source of renewable energy in Iowa; however, little is known of the effect on wildlife. This project will examine the abundance, behavior, and/or movement of wildlife near towers at the 89-tower Top-of-Iowa wind farm. Target taxa include migratory birds, including Canada geese, and bats.

Development of population models for harvest management of mourning doves

A critical component of informed management of game species is a set of population models that integrate available knowledge about life history parameters of the species. This project involves synthetic analysis and modeling of available data from banding and breeding ecology studies with the objectives of providing a tool for making predictions about the population effects of harvest regulations and for prioritization of research and monitoring programs to improve model reliability.

Evaluation of sampling designs for surveillance and monitoring of the prevalence and spatial distribution of disease in wildlife populations

Early detection of wildlife disease vectors is critical to development of control strategies and, when human health is a concern, for public awareness and education. The objective of this project is to use analytical and simulation techniques to evaluate the statistical properties of several sampling designs for estimating parameters associated with wildlife diseases. Initial emphasis will be on methods related to the occurrence of chronic wasting disease in wild cervid populations.

Balancing food supply and sport fish demand in a managed walleye fishery – Spirit Lake, Iowa

Spirit Lake, Iowa is one of the state's most important sport-fishing lakes. This project examined the balance of food supply (primarily prey fish) and demand for game fish in the lake. The number of native species present in Spirit Lake was found to have declined by approximately 25% over the last 70 years. Walleye and yellow perch were the dominant species in Spirit Lake. Roughly 90% of the consumption of fish in Spirit Lake is attributable to stocked walleye. In some years, there is considerable cannibalism of newly stocked walleye by larger, older walleye. We developed models that allow fishery managers to estimate annual sport fish consumption from readily available data on population size and average fish weight.

OTHER UNIT HIGHLIGHTS

Robert Fletcher, Jr. (PhD student of Dr. Koford) received the best student poster award from the North Central Section of The Wildlife Society, for a poster at the 63rd Midwest Fish and Wildlife Conference.

KANSAS COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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KANSAS DEPT OF WILDLIFE AND PARKS
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U.S. GEOLOGICAL SURVEY

Philip Gipson *Unit Leader*
Research focus is predator ecology, human and wildlife interactions, and environmental risk analysis.

Jack Cully *AUL Wildlife*
Primary research focus is on the disease ecology of sylvatic plague in black-tailed prairie dogs at population, metapopulation, and community levels, and how this affects species diversity of prairie dog dependent species at the landscape scale.

Kentucky Warbler *(Oporonis formosus)*

RESEARCH HIGHLIGHTS

Land Condition Trend Analysis on Fort Riley, Kansas 1997-2001

Objectives were to monitor bird, small mammal, and vegetation communities and evaluate long-term responses to military training. Trends among small landbird populations on Fort Riley were analyzed and species richness remained relatively stable over a 10 year period. Species richness averaged 39 species per year. At the completion of this research, refinements in field protocols were implemented and the master database was updated.

Land Condition Trend Analysis on Fort Riley, Kansas 2001-2006

We are evaluating new methods of assessing the impacts of military training on Fort Riley to birds, small mammals, and vegetation. New studies include the use of a low-level aerial photography system to document the amount of military disturbance on study plots, evaluation of an indirect measure of small landbird productivity, and determining the optimum trap density for monitoring small mammal populations.

Seasonal diets and population densities of coyotes in northeastern Kansas

We determined the seasonal diets of a coyote population with an unusually high density (0.8 to 0.9 coyotes/km^2). Cottontail rabbits, small rodents, and other mammals occurred in 87% of scats, followed by insects (33%), fruits (15%), birds (14%), human garbage (7%), and reptiles (2%).

GAP Analysis in Kansas

This project has been completed and maps showing land use cover, vertebrate richness, and stewardship are completed, along with the final report. Products in development include a web site and a customized interface with ArcView.

Abiotic Factors and Species Interactions that Influence Recruitment of Walleyes in Kansas Reservoirs

This study examined factors influencing variability in walleye recruitment in seven Kansas reservoirs, and the influence of temperature and prey availability on growth and survival of larval walleyes in Glen Elder Reservoir, Kansas. We found that abiotic conditions differed from natural lakes and rivers, but fish communities were comprised of species with little or no history of co-occurrence. The results suggest that recruitment of walleyes is highly variable within and among reservoirs.

UNIT HIGHLIGHTS

Michael Quist (Ph.D. Student) received both the Best Paper and Best Poster Awards at the Annual Meeting of the Kansas Chapter of the American Fisheries Society.

Philip Gipson (Unit Leader) is currently serving as an Associate Editor of *The Wildlife Society Bulletin*.

Jack Cully (Assistant Unit Leader for Wildlife) gave an invited seminar at the College of Veterinary Medicine, Kansas State University on "Sylvatic plague and the black-tailed prairie dog."

LOUISIANA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Sammy King *Unit Leader*
Wetland restoration and management; wetland wildlife. Research focuses on effects of sedimentation and hydrology on wetland plant and animal communities, amphibian habitat relationships, moist-soil management, and forested wetland management.

Frederick Bryan *Research Scientist*
Geochemistry, larval fishes, and primary production in large rivers and coastal estuaries. Current research focuses on description of physicochemical events associated with development of hypoxia tied to flood cycles in river swamps.

Megan La Peyre *AUL Fisheries*
Coastal wetland ecology. Research focuses on coastal restoration including marshes and shallow water habitats, nekton use of restored and natural habitats, submerged aquatic vegetation ecology, and evaluation of coastal management.

Alan Afton *AUL Wildlife*
Avian behavioral ecology, especially waterfowl. Research focuses on reproductive behavior, habitat selection and use, nutritional ecology, importance of nutrient reserves to survival and reproduction, and evaluation of wetland habitat management techniques.

UNIT HIGHLIGHTS

Dr. Sammy King was recently hired as the Unit Leader. He has served most recently as an Assistant Professor at the University of Tennessee and as a research ecologist with the USGS National Wetlands Research Center. He has worked extensively in the Lower Mississippi River Alluvial Valley on a wide range of wetland restoration and management issues. He is excited about continuing his work in floodplain systems as well as expanding research into the coastal marshes of Louisiana.

RESEARCH HIGHLIGHTS

Nekton use of shallow water habitats

This study evaluates the importance of submerged aquatic vegetation, including patch size, and location in supporting nekton (fish and decapod crustaceans).

Oyster reef ecology

One objective of this research is to test the hypothesis that oyster reefs are essential fish habitat for many resident species.

Spring migration ecology of lesser scaup in the Mississippi Flyway

One objective of this study is to test the Spring Condition Hypothesis, which postulates a long-term decline in female body condition upon arrival on breeding areas has been a major factor in the recent decline of the continental population of scaup.

Gulf-coast River Studies

Field work and data analyses have been recently completed for several long-term investigations of ecological processes in Gulf-coastal river ecosystems. Projects include: (1) Recurring hypoxia and geochemical events associated with flooding cycles in the Atchafalaya River Basin; (2) Effects of anthropogenic activities on the chemistry and periphyton in 1st- and 2nd-order coastal plain streams on Fort Polk Reservation, Louisiana; (3) Geochemistry associated with an experimental cut on a headwater stream in Kisatchie National Forest; and (4) Influences of tide and photoperiod on movements of larval fishes and crustaceans in a Texas tidal channel. Completion reports have been filed for these projects, and preparation of manuscripts for publication is under way .

MAINE COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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U.S. GEOLOGICAL SURVEY

William B. Krohn *Unit Leader*
Ecology of forest carnivores and selected waterbirds, modeling species-habitat relations, and land conservation planning. Especially interested in broad-scale factors and processes that determine the occurrences of species, including their historical distributions.

Cynthia S. Loftin *AUL Wildlife*
Wetland and systems ecology, wetland restoration issues, wetland responses to alterations in structuring processes, use of GIS to examine wetland change and wetland response to changes in hydrological conditions.

RESEARCH HIGHLIGHTS

Habitat Ecology of the Canada Lynx in Maine and the Northeast.
Habitat models were developed and tested to determine factors affecting lynx distribution at two scales: northeastern U.S.A. and eastern Canada, and northwestern Maine. Deep annual snowfalls and large blocks of regenerating conifer forests (i.e., extensive areas of high quality snowshoe hare habitat) were found to be key determinates of lynx occur. Implementation of these findings through the appropriate management authorities is on-going, and we hope to do additional testing of the northwestern Maine model in the future. This work was done collaboratively with Dr. D. J. Harrison of the University of Maine.

Historical Wildlife Information.
Whether or not certain wildlife species occurred historically in Maine, and the Northeast, continues to be a source of controversy, especially as related to listing under the Federal Endangered Species Act (ESA). Data from the early 1600s to the early 1900s is being located, compiled, and organized on the Canada lynx, cougar, wolf, moose, white-tailed deer, woodland caribou, and wolverine. While providing information of direct use to various ESA questions (e.g., Did the species occur historically? If so, has the range contracted?), plans call for thorough analyses of these data to identify the ecological factors and processes that affect change in abundance or distribution.

Environmental Factors Associated with Unique Lake Communities in Maine.
Naturally fishless lakes provide habitats for uniquely structured animal communities. There are at least 30 lakes in Maine thought to be naturally fishless, and many lakes currently with fish are known to have been fishless prior to stocking. The ability to predict the likelihood that a particular lake is currently or historically fishless would assist wildlife managers in balancing recreational management objectives with the responsibility to protect unique wildlife habitats. We are sampling invertebrates in lakes that are currently "fishfull" and comparing those with lakes that have various degrees of fishlessness (naturally and those with a history of stocking). These data are combined with geomorphic and geographic information to develop GIS-based models predicting regions where lakes are likely to be naturally fishless. Macroinvertebrate indicator species will be used to assess the accuracy of model predictions.

Effects of Landscape Heterogeneity and Environmental Stressors on Palustrine and Lotic Amphibian Populations in Acadia National Park
Developing reliable search methods for amphibians is a first step in determining population status and identifying causes of apparent worldwide declines in amphibians. We are: identifying environmental correlates related to selected amphibian species' occurrences in Acadia National Park wetlands to improve surveying efforts; evaluating the relationship between mercury contamination in two-lined salamanders and environmental conditions; and, developing species-habitat models of selected amphibian species at various spatial scales. Future surveys will expand beyond ANP to other areas in Maine and the eastern US.

OTHER UNIT HIGHLIGHTS

Dr. Krohn received the Cooperative Research Units National Leadership Award for building cooperative relationships with state agencies and non-governmental organizations that facilitated the use of Unit research findings in land conservation planning.

E. G. Schilling (MS student of Dr. Moring [now deceased] and current PhD student of Dr. Loftin) received the Best Student Poster Award by the Northeast Division of the American Fisheries Society.

MARYLAND COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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James Wiley *Unit Leader*
Endangered ecosystems conservation, tropical ecosystems, and the ecology of parrots, raptors, and reptiles. International activities include research and conservation of endangered species in the Carribean.

Steven Hughes *AUL Fisheries*
Fish physiology and nutrition, aquaculture, and water recirculating system design and function. Also the interaction of husbandry practices and fish health.

Dixie Bounds *AUL Wildlife*
Wildlife and terrestrial ecology. Research also includes the conservation of endangered species and the ecosystem impacts of introduced species.

RESEARCH HIGHLIGHTS

Shorebird habitat use and availability during spring migration through Delaware Bay in relation to horseshoe crab spawning
Delaware Bay provides stopover habitat and food resources (horseshoe crab eggs) for the second largest number of migrating shorebirds within the Western Hemisphere. Our research recommends that wetlands managed for shorebirds should have sparse vegetation density (<25%), short vegetation height (<10 cm), shallow water depths (0-4 cm), and abundant invertebrate food resources. Sites with high shorebird and horseshoe crab concentrations should have limited public access to minimize disturbance to feeding birds and spawning horseshoe crabs.

Chesapeake Bay ecosystem GAP analysis
The first stage in conducting a GAP analysis of the Chesapeake Bay Ecosystem involves developing an updated vegetative land cover map. Working in collaboration with the US Geological Survey National Mapping Division, this project is participating in the development of an updated National Land Cover Dataset for the Middle-Atlantic Region (Maryland, Delaware, New Jersey, Pennsylvania, West Virginia, and Virginia).

Investigations into acute mortality among sport fishes subjected to catch and release stress
Previous work in our laboratory indicates that an alteration in blood pH may be the most reliable indicator of the degree of physiological stress and that the dominant type of musculature (red or white) may explain why some fish are more resilient to the stresses of catch and release than others. Work is continuing to characterize the predominate muscle types for several species and to correlate these anatomical and physiological data.

Demography and conservation of ground-nesting Bahamas parrots
The Bahamas Parrot is currently restricted to two Islands – Abaco and Great Inagua. Information on the demography of this unusual parrot is scarce and the Maryland and North Carolina Units are working with the Bahamian government to save this endangered species.

OTHER UNIT HIGHLIGHTS

Monica Williams (M.S. graduate student of Dr. Bounds) received the Student of the Year award from the Maryland/Delaware Chapter of the Wildlife Society.

Sherry Daugherty and Dana Limpert (M.S. graduate students of Dr. Bounds) both were selected to appear in Who's Who Among Students in American Universities and Colleges 2001-2002.

MASSACHUSETTS COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE

Stephen DeStefano *Unit Leader*
Population ecology and habitat relationships of terrestrial and semi-aquatic (e.g., waterbirds) wildlife, with the long-term goal of understanding how habitat quality influences demographic performance. Implications of these for conservation biology, recovery of endangered species, and the impact of humans on wildlife populations

Paul R. Sievert *AUL Wildlife*
Conservation biology, physiological ecology, and biostatistics. Energy and water balance influences on the nesting ecology of marine birds, the estivation behavior of turtles, establishment of species range boundaries, methods for estimating survival rates, and the use of population viability analyses in conservation biology.

Martha E. Mather *AUL Fisheries*
Factors that structure aquatic communities in lakes, streams, rivers, and the ocean with particular emphasis on predation, competition, and abiotic influences. Interfacing aquatic ecology and fisheries biology by using basic ecology to address applied management questions on both a mechanistic and broad geographical scale.

MISSION STATEMENT

The Mass. Unit has identified 2 areas of focus that not only create the potential to develop expertise for Unit scientists, but also will assist with the primary information needs of the Massachusetts Divisions of Fisheries and Wildlife and Marine Fisheries and Region 5 of the U.S. Fish and Wildlife Service and that also are designed to help fulfill aspects of the Strategic Plan developed by the Department of Natural Resources at the University of Massachusetts.

(1) Suburban Ecology: Animal and Human Ecology in Human-dominated Landscapes. The entire nation is experiencing tremendous growth and development, particularly along the interface between urban and rural areas. This suburban growth includes housing developments, industrial parks, shopping malls, roadways, and other structures that obliterate, alter, or otherwise impact terrestrial and aquatic habitats and the wildlife and fish populations. In addition, human perceptions and attitudes toward wild animal populations are changing, with species that were once considered desirable as either game species or as members of an ecological community now regarded as pests and health threats.

(2) Applying quantitative approaches to research into natural resources issues has always been important. More recently, however, is the need and opportunity to use meta-analysis techniques for examining larger, regional questions. The Mass. Unit will work within the Department of Natural Resources Conservation and with cooperators to develop and explore regional databases in order to expand the scope and effectiveness of applied research. At the same time, the Unit will facilitate the use of quantitative methodologies for research and management, and offer training in these techniques for graduate students and professionals.

UNIT PROJECTS

- Ecological aspects of wildlife populations along an urban-rural gradient
- Distribution and habitat of roadrunners in an urban environment
- Population structure and habitat of Swainson's hawks.
- Spatial ecology of a grassland predatory bird community
- Influence of diet on northern goshawk productivity
- Status of Yuma clapper rails in the Cieniga de Santa Clara, Mexico
- Distribution of waterbirds in the Colorado River delta
- Effect of water level fluctuations on river herring populations in coastal streams
- Effect of piscivores on survival and distribution of juvenile anadromous fish in the lower Connecticut River
- Factors influencing the early life history of cunner, a temperate reef fish
- Ecology and conservation of Blanding's turtles in Mass.
- Small mammal ecology and the prevalence of Lyme disease on Martha's Vineyard
- Factors influencing nest success of piping plovers
- Effect of firebreak maintenance on rare insects of Correllus State Forest, Massachusetts
- Limitations to the distribution of Virginia opossums
- El Niño effect on nesting patterns of solitary marine turtles in Corcovado National Park, Costa Rica
- Population recovery of short-tailed albatrosses

MINNESOTA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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MINNESOTA DEPARTMENT OF NATURAL RESOURCES
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE

David Andersen *Unit Leader*
Avian ecology and conservation, with emphasis on population dynamics, survey methodology, and bird-habitat relationships. Population ecology and the effects of human activity on wildlife and its habitat.

Bruce Vondracek *AUL Fisheries*
Understanding the interaction in relation to land use practices, water quality, and fish and invertebrate assemblages, primarily in agricultural settings, to assess ecosystem health or biological integrity.

David Fulton *AUL Wildlife*
Human dimensions of fisheries and wildlife management, focusing on developing and testing social psychological theory and measurement approaches regarding human cognitions and behaviors related to natural resource use and conservation.

Mission of the Minnesota Cooperative Fish and Wildlife Research Unit:

To develop and conduct programs of research and education related to fish and wildlife resource conservation, and to provide technical expertise to resource management. Emphases for these programs include the impacts of human activities on aquatic and terrestrial ecosystems and the human dimensions of natural resources conservation at the state, national, and international scales. These programs are to result in science that has both academic and practical impact, and graduates who are well trained as professionals.

RESEARCH HIGHLIGHTS

Ecology and Conservation of Northern Goshawks in Minnesota and the Western Great Lakes Region

To address information needs necessary to develop conservation plans that incorporate considerations for goshawks, MN Coop Unit scientists, students, and collaborators are conducting studies on home range and habitat use, landscape-scale survey design, diet, and residency, and have monitored annual productivity of goshawks in northern Minnesota. In part based on these studies, we have developed a research and monitoring strategy for goshawks, and prepared a conservation assessment for state and federal natural resources agencies, non-governmental agencies, and private industry.

American Woodcock Fall Ecology and Conservation in the Western Great Lakes Region

In response to concerns about declining indices to woodcock abundance, MN Coop Unit scientists, students, and collaborators are studying mortality factors, factors affecting movements, habitat use, and migration of woodcock in Minnesota, Wisconsin, and Michigan. Results of this study will aid in management of woodcock and their habitats in the Upper Midwest.

Effects of Biotic and Physical Heterogeneity on Trophic Interactions in Headwater Streams

Objectives are to examine the effects of species introductions on food web relationships in small streams by examining interspecific interactions between slimy sculpin (native) and brook trout (native), and slimy sculpin and brown trout (non-native) and examine the potential for a trophic cascade, by measuring top-down effects of fish through changes in benthic macroinvertebrate abundance and composition in the presence of various combinations of fish predators. The goal is to test whether heterogeneity in biotic and physical factors (such as changes from native to non native top-level predators, and altered stream temperature, sediment concentrations and substrate composition have a strong effect on trophic cascade dynamics in natural stream ecosystems.

Assessing Trends in the Motivations, Experiences and Satisfaction of Wildlife-based Recreation Activities

To more effectively manage wildlife and fisheries based programs such as hunting, fishing and wildlife viewing, MN Coop Unit scientists, students and MN Department of Natural Resource scientists are developing and assessing psychometric measurement tools to collect information concerning the motivations, experiences and satisfaction of participants in these recreation activities. The database developed in this project will allow reliable assessment of changes in the quality of recreational experiences and satisfaction with agency programs.

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WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Hal Schramm *Unit Leader*
Research in recreational fisheries management, fish population ecology, and large river ecology and management.

Steve Miranda *AUL Fisheries*
Research interests center on recreational fisheries management in lakes and reservoirs of the southern U.S., as well as on fish communities and commercial fisheries in South American reservoirs.

Francisco Vilella *AUL Wildlife*
Vertebrate population ecology, species-habitat relationships, habitat restoration, and landscape ecology. Endangered species conservation, population restoration and reintroduction of captive-reared individuals. Neotropical wildlife conservation and management. International activities include research in the Caribbean and South America.

RESEARCH HIGHLIGHTS

Mississippi GAP

The Mississippi GAP Analysis Program (MSGAP) is a rapid, large-scale assessment of the habitat distribution and protective status of all of Mississippi's terrestrial vertebrate species. GAP uses an underlying premise that knowledge of an animal's habitat can be used to predict presence or absence over broad scales. Thus, a species true distribution can be defined by the distribution of suitable habitat within the range of existence of that species. Statewide databases have been developed for vegetation and landcover, terrestrial vertebrate distributions, and land ownership. Resulting spatial models will highlight species-rich hotspots in the state not represented in the current network of protected areas.

Electrofishing Injury

Electrofishing is one of the most common fish collection methods used by aquatic scientists in North America. The Mississippi Unit is completing an extensive laboratory study about the effects of electrofishing on warmwater game and nongame fish treated to diverse power levels and duty cycles ranging 1.5 to 100% Results show little evidence of injury to large-bodied fish such as largemouth bass, black crappie, bluegill, and channel catfish 12-45 cm total length. Nevertheless, we have observed substantial mortality of some small game and nongame species such as largemouth bass, bluegill, madtoms, darters, and minnows 3-7 cm long. In general, immobilization was most efficient at intermediate duty cycles, and mortality was highest at low duty cycles. Limited studies also showed reduced growth of minnows. Manipulation of power and form of electricity delivery to control harmful effects are being investigated.

OTHER UNIT HIGHLIGHTS

Dr. Vilella received the 2002 Dean's Award for Excellence from the College of Forest Resources at Mississippi State University in recognition of outstanding contributions and performance in the Forest and Wildlife Research Center.

For more information about the Mississippi Unit scientists, their research and publications, and their host institution, go to http://www.cfr.msstate.edu

MISSOURI COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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MISSOURI DEPARTMENT OF CONSERVATION
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Charles Rabeni *Unit Leader*
Stream ecology and management, especially strategies for mitigating effects of land uses on fish populations

David Galat *AUL Fisheries*
Ecology of large river-floodplains, particularly fish habitat use, hydrology and biota linkages, and ecological aspects of channel-floodplain connectivity. Research emphasis is on designing and assessing flow and habitat restoration strategies to benefit native biota.

Ronald Drobney *AUL Wildlife*
Nutritional ecology, bioenergetics and population parameter estimation for waterfowl and upland birds. Also, the ecology of endangered bats and the refinement of Anabat detector technology for bat research

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RESEARCH HIGHLIGHTS

Giant Canada goose ecology and management.
This 13 year study provided the data necessary to develop proactive, biologically sound and socially acceptable strategies of managing expanding local goose populations. Population models incorporating the efficacy of potential management alternatives developed have provided an important foundation for managing geese at the state, flyway and national levels.

Ecology of the endangered Indiana bat and factors influencing population declines.
We determined the location and characteristics of maternity colony roost sites and evaluated the potential effects of roost habitat availability and environmental contaminants on population declines.

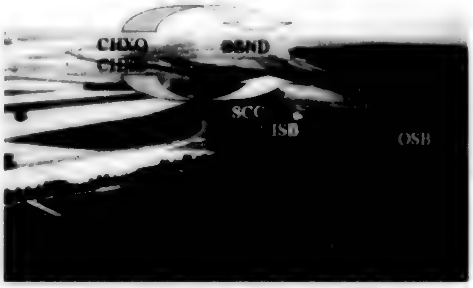
Effects of sediment on stream life.
Is excess sediment as great a problem as portrayed? It is difficult to say because the true spatial and temporal dimensions of this situation are not known. Through a series of experiments, surveys and meta-analyses we are developing an understanding of "normal" sediment conditions in various ecoregions and stream types, activities that cause deviations in these "normal" conditions, and the actual and likely effect of both suspended and deposited sediment on warmwater stream life. Linking laboratory "effects" studies with actual conditions occurring in Missouri streams will allow a rational evaluation of the dimensions of the threat.

Fish use of lower Missouri River sandbar habitat.
Sandbars provided important nursery habitat for riverine fishes along the pre-regulation Missouri River. Over 90% of this critical habitat has been lost through channelization and bank stabilization. Objectives are to characterize larval fish use of shallow-water, low-velocity habitats associated with different sandbar types, relate habitat availability and use to river stage, and determine temperature and hydrology effects on spawning times and growth of selected species. Results will be used to design sandbar rehabilitation programs and evaluate flow normalization alternatives.

OTHER UNIT HIGHLIGHTS

Ron Drobney was honored with the Gold Chalk Outstanding Teacher Award, the Faculty Outstanding Performance Award and nominated for the Outstanding Contributions to Graduate Education Award, all from Missouri University.

David Galat received a Certificate of Appreciation from the U.S. Fish and Wildlife Service for participation on a scientific panel evaluating flow and habitat issues for Missouri River endangered species. He serves as the America's Editor for the journal River Research and Applications, and is a member of the National Academy of Sciences National Research Council committee to assess the U.S. Army Corp of Engineers' water resources planning protocols.



Channelized Missouri River showing habitat units sampled for benthic fishes BEND river bend, CHXO channel cross-over, ISB inside bend, OSB outside bend, SCC secondary channel not-connected

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MONTANA STATE UNIVERSITY
MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
U.S. GEOLOGICAL SURVEY

Al Zale *Unit Leader*
Native fish restoration and management, whirling disease, regulated river and reservoir management

Christopher Guy *Assistant Unit Leader*
Population ecology with emphasis on factors influencing growth, recruitment, and mortality of fishes in lotic and lentic ecosystems. Research on fisheries management issues with emphasis on indices and harvest regulations.

RESEARCH HIGHLIGHTS

Thermal requirements of bull trout

We recently completed a multi-year laboratory study of the thermal biology of threatened bull trout. The study defined the upper thermal limits and growth optima of juvenile bull trout using the acclimated chronic exposure protocol. Additional trials compared the performance of bull and brook trout in sympatry over a range of temperatures and compared performance of bull trout in fluctuating and constant-temperature environments. A recently-initiated study examines similar aspects of the thermal ecology of westslope cutthroat trout.

Whirling disease

The objective of a current field study is to quantify temporal and spatial distributions of whirling disease actinospores (the spores that infect fish) in open waters using packed-bed filtration, a technique which we developed and is the only validated technique for this purpose. In the lab, we tested factors affecting the resistance of juvenile rainbow trout to whirling disease, including influences of fish age and size, parasite dose, and acquired immunity. Whirling disease was significantly reduced when fish were exposed to the parasite for the first time at 9 weeks posthatch or older, although fish of any age could become infected (but not diseased). Disease intensity was directly related to parasite dose. Both age and size of fish at first exposure affected disease intensity. An acquired immune response to the parasite was present, but immunization also induced disease in the fish, which outweighed the benefits of the protection.

Sauger movements, exploitation, and development of a conservation agreement

We are examining aggregation and exploitation rates of sauger in the Yellowstone River to ascertain the need for restrictive harvest regulations. The population has declined in recent years and it was hypothesized that excessive angler exploitation occurs when the fish aggregate in spring prior to spawning. We have found that exploitation is low during the pre-spawn aggregation period and higher in autumn when the fish are dispersed throughout the river. Entrainment at irrigation diversions appears to be a major source of mortality.

Sauger are common in only about 21% of their former range in Montana. Causes of the decline are unknown, but suspected causes include low flows, alteration of flows by dams and diversions, entrainment in ditches and diversions, and interactions with non-native species. The Unit is preparing a conservation agreement for sauger in Montana that will outline data gaps, identify threats, limiting factors, and provide a springboard for hypothesis-testing research.

Pallid sturgeon

Current restoration efforts have focused on stocking pallid sturgeon in the Missouri River. Stocking can be used to supplement or maintain populations, but evaluation of these fish is necessary to understand their contribution to the population. The objective of this study is to evaluate habitat use, macro-movement, food habits, and growth of juvenile hatchery-reared pallid sturgeon.

OTHER UNIT HIGHLIGHTS

Our Unit has experienced a virtual metamorphosis in the last year, including new personnel at the Unit Leader, Assistant Unit Leader, and Administrative Assistant positions, a new Cooperative Agreement, new policies and protocols, new courses, new student offices, and a new laboratory. These changes translate directly into better service for our Cooperators.

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WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Joe Ball *Unit Leader*
I am interested in the factors influencing recruitment of ground-nesting birds and the effects of these factors on demographic performance. Most of my work is centered on nesting ecology of upland-nesting ducks in and adjacent to the Prairie Pothole Region, with emphasis on anthropogenic changes to wetland grassland habitats and to communities of native carnivores. Working with graduate students and collaborators from other Universities and Agencies, I investigate the causes of population declines in birds and search for solutions to related conservation problems. Such solutions must be ecologically sound, economically efficient, and acceptable to managers and the public.

Thomas Martin *AUL Wildlife*
Understanding the ecology and evolution of phenotypic traits that are also important to conservation. Birds are used for tests because behaviors and fitness components can be readily measured and they are widespread across habitats and ecosystems. I concentrate on an integrated set of four areas: What are the ecological and evolutionary determinants of 1) Habitat and Nest Site Selection, 2) Species Coexistence, 3) Life History and Population Dynamics, and 4) Social Behavior and Sexual Selection? These topics include examination of responses to climate change, anthropogenic disturbance, and land management programs.

RESEARCH HIGHLIGHTS

BBIRD
The BBIRD (Breeding Biology Research and Monitoring Database) program is a national, cooperative program that uses standardized field methodologies for studies of nesting success and habitat requirements of breeding birds across the U.S. to allow comparisons among space, time, and habitats and examination of landscape influences - see: pica.wru.umt.edu/bbird

Avian Reproductive Success
Long-term (18 years) ongoing research in high elevation riparian drainages in northern Arizona finds that birds have adaptive nest site selection but choices shift with changing weather. Results indicate that predation has a strong influence on habitat choice, parental behaviors and breeding productivity. At the same time, long-term changes in vegetation related to elk browsing, weather, and fire suppression is leading to long-term declines in species of conservation concern.

Predator Avoidance Strategies
Comparative work between Arizona versus Venezuela and South Africa demonstrate strong differences in life history (demographic) attributes that reflect latitudinal gradients in selection pressures and alternative solutions to predation mortality.

Midcontinent Mallards
Wildlife populations rise and fall based on the "balance" between births and deaths (for the sake of simplicity we will rule out immigration and emigration). The birth and death processes can be categorized and measured as "vital rates"; the quantitative and biological relationships among those rates dictate the amount and direction of population change over time. Furthermore, vital rates can be classified as those that operate during spring and summer versus those that operate during fall and winter. Advances in methods for modeling and analyzing population processes, along with an enormous amount of detailed biological information on mid-continent mallards allow improved evaluation of the relative "importance" of variation in vital rates to demographic performance of this population over the last several decades. Contributions of vital rates to population change in mid-continent female mallards were nest success (43%), breeding season survival of adult hens (19%), and survival of ducklings (14%). Vital rates operating outside of the breeding season (fall-winter survival of adult females) accounted for only 9 % of variation in estimated demographic performance. Thus, demographic processes occurring Spring and Summer on the breeding grounds appear to strongly (90+%) dominate the processes that have caused recent population change in midcontinent mallards

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U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE

Bruce Thompson *Unit Leader*
GIS applications to ecological context and conservation planning, research design and management, avian ecology, conservation communication processes and applications

Colleen Caldwell *AUL Fisheries*
Research interests include aquatic animal health, aquatic contaminants and toxicology, and ecological effects of environmental disturbances on aquatic systems. Research emphasis is threatened and endangered native southwestern fishes.

Louis Bender *AUL Wildlife*
Ecology and management of large mammals; factors regulating/limiting wildlife populations; predator-prey relations; population and habitat management; forest ecology and management; wildlife nutrition and disease.

RESEARCH HIGHLIGHTS

Source, transport, and fate of mercury in south central New Mexico.
Fish monitoring programs in New Mexico water bodies have detected total mercury concentrations in sport fish that have resulted in statewide fish consumption advisories. A potential source for mercury contamination may be atmospheric deposition (wet and dry), which is currently being explored at a monitoring site established in 1997 by the New Mexico Research Unit.

Restoration of the Rio Grande Silvery Minnow.
Historically, the Rio Grande silvery minnow (listed as federally endangered in 1994) was relatively widespread and abundant, occurring in main stem habitat throughout the Rio Grande from near the confluence of the Rio Chama to the Gulf of Mexico and in the Pecos River from Santa Rosa, NM to the confluence with the Rio Grande. Today, it occurs only within a 280 km (174 mile) stretch of the middle Rio Grande resulting in 95% reduction of its historical range. Research at the New Mexico Unit is assisting with recovery efforts in characterizing dietary requirements throughout the species' many life history stages as well as refining intensive culture practices for rearing the fish in captivity in cooperation with USFWS and New Mexico State University.

Predictive Habitat Modeling for the Endangered Aplomado Falcon in the northern Chihuahuan Desert.
Five years of Research Unit investigations culminated in a spectrally based model and map depiction of habitat suitability for aplomado falcons in a 247,000-km^2 study area in southern New Mexico, western Texas, and northern Chihuahua, Mexico. Highly suitable habitat was predicted for about 35,700 km^2 of that area. This information and a habitat assessment protocol produced as part of the research are used by land management and regulatory agencies (especially BLM and USFWS) for conservation planning and land management decisions to benefit this endangered bird in its native range.

Assessing Desert Bighorn Sheep Habitat in Ladron Mountains, central New Mexico.
The Research Unit, in cooperation with BLM and New Mexico Department of Game and Fish, completed investigation of bighorn habitat use in relation to pinyon-juniper (*Pinus-Juniperus*) trees killed by past prescribed fire and drought. Research outcomes were reported and photographically documented to support management planning in relation to future fire prescriptions and subsequent evaluation of habitat response.

OTHER UNIT HIGHLIGHTS

The Research Unit, in cooperation with Fishery and Wildlife Sciences and Cooperative Extension faculty at New Mexico State University, conducted a 2.5-day training short course in ecological principles, new technology, and conservation communication topics. Twelve participants represented the New Mexico Game Commission, New Mexico Department of Game and Fish, conservation organizations, commodity groups, and news media.

The Research Unit continued assistance to New Mexico Department of Game and Fish to conduct the annual special lottery selection of big game licensees. This assistance includes computer programming, electronic drawing, and report preparation to meet legal requirements for the state agency. More than 100,000 applicants were included in drawing for about 43,000 licenses.

NEW YORK COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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CORNELL UNIVERSITY
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WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Milo Richmond *Unit Leader*
Research involves all the major vertebrate taxa. Current research involves (i) analysis of biodiversity in the Hudson River Corridor, (ii) population dynamics of colonial waterbirds, immunocontraception of white-tailed deer, and population dynamics of cormorants.

Richard Malecki *AUL Wildlife*
Waterfowl biology, ecology, population dynamics and management. Research also involves work with wetland ecology, marsh birds, environmental contaminants, fire ecology, and both native and exotic species management.

INTERNATIONAL RESEARCH & TEACHING HIGHLIGHTS

The New York Unit (M. Richmond and K. Hunsinger) assisted in bringing the Province of Ontario, Canada, into consultation with our Breeding Bird Atlas Steering Committee for resolving issues of species relative abundance and expanding discussion of methodology for measuring density of breeding birds in New York. Our primary contacts have been with Michael Cadman, Ontario Atlasing Coordinator, and Dr. Charles Francis, Senior Scientist, Bird Studies Canada.

Mark Bain taught a graduate level course titled *Habitat Ecology and Modeling* at the University of Agricultural Sciences in Vienna, Austria. This invited and sponsored teaching opportunity included lectures and exams for 10 students.

Unit personnel (R. Malecki and S. Sheaffer) recently began working with U.S. and Canadian biologists to improve knowledge about Atlantic brant seasonal movement patterns, migration chronology, critical staging areas, and important breeding colonies. Through satellite tracked radio transmitters, work continues with tracking international movement of Canada geese and tundra swans.

Milo Richmond, with assistance from Paul Curtis, Bill Miller, Gwen Curtis and Elizabeth Rowland completed research on herbivore resistance to natural plant compounds. The goal of this project was to provide homeowners with options for designing herbivore-resistant landscapes that would not require chemical repellents or fencing. Feeding trials with captive prairie voles (*Microtus ochragaster*) identified several species of horticultural bulbs that were resistant to herbivore browsing. Freeze-dried, powered bulb material reduced vole consumption of applesauce by more than 90% when compared to untreated feed for several species and varieties. Additional field trials with free-ranging white-tailed deer (*Odocoileus virginianus*) are currently underway.

UNIT HIGHLIGHTS

Review Panels/Advisory Groups

Unit participated on review panel and advisory groups for judging program directions and awarding grants. Some examples are: NY DEC's Hudson River Estuarine Research Reserve fellowships, New York-New Jersey Harbor Estuary Program, National Science Foundation Grant Program on Dynamics of Coupled Natural and Human Systems, Cornell Center for the Environment Faculty Research Steering Committee, and the National Science Foundation Workshop on the Science of River Flows for Biodiversity.

Resident Canada Geese

Unit continues to assist the State Department of Environmental Conservation in their effort to learn more about locally breeding Canada geese and wintering concentrations comprised of individuals from mixed populations. Currently, satellite tracking is being used to monitor molt migration of local breeders and non-breeders from around the state. The coming year will see an expansion of this work to also include movements of geese breeding in PA, NJ, CT, MA, RI, and ME.

Planning and Development

Unit continues its involvement with the Montezuma Wetland Complex Research Institute in central New York through representation on the steering committee. Unit continues to play an important advisory and facilitation role for the Second New York State Breeding Bird Atlas that is now underway. Staff affiliated with the New York Unit (C. Smith) are playing key advisory roles in the current forest management planning process for Finger Lakes National Forest. Unit staff and associates are also actively involved with the Cornell Cooperative Extension Biodiversity Conservation Project Work Team in an outreach and extension effort in the Hudson River Valley.

Award

Richard Malecki and **Milo Richmond** were co-winners of the 2001 Outstanding Professionals Award, presented at the 2002 Annual Meeting of the New York Chapter of the Wildlife Society on February 7, 2002.

NORTH CAROLINA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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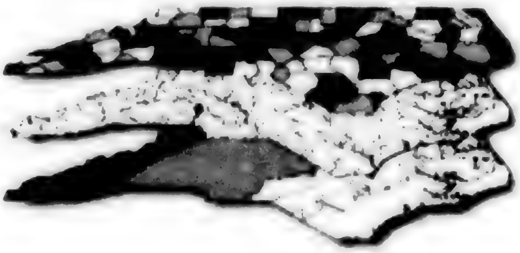
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Tom Kwak *Unit Leader*
Fish ecology, impacts of environmental alterations, and biotic interactions, especially in the stream environment. Emphasis on relating physical and biotic factors to the ecological success of fishes at different spatial and temporal scales.

Jaime Collazo *AUL Wildlife*
Avian population dynamics, species-habitat relationships, especially of endangered species. Also, predator-prey relationships, foraging ecology, and breeding productivity. International activity includes research and conservation in the Caribbean.

Joe Hightower *AUL Fisheries*
Population dynamics and management, particularly for anadromous fishes. Research involves a combination of field and simulation studies to characterize life history strategies and critical habitat.

Ted Simons *AUL Ecology*
Wildlife conservation and the development of multi-disciplinary approaches to the conservation of protected areas. Primary focus has been the application of ecological principles to the conservation of rare and endangered species and their habitats.



RESEARCH HIGHLIGHTS

Migration of anadromous and resident fishes after dam removal in the Neuse River, North Carolina
Objectives are to document migratory patterns of anadromous and resident fishes; the effect of flow and temperature on movement and distribution, and to estimate run size of American shad and striped bass. Knowing how restored habitat is utilized will be valuable for predicting the benefits of dam removal in other systems and for developing a flow regime to improve spawning conditions in the Neuse River.

North Carolina GAP analysis
Objectives are to develop three statewide databases for the North Carolina GAP Project. Geographic Information System data will identify areas in the state that support species which are under-represented in the conservation network of lands. The vertebrate database will include information on over 400 terrestrial species that breed in North Carolina.

Effects of landscape pattern, core areas, and forest management practices on avian communities in the southeast
Objective is to develop an ecosystem level approach to understanding the conservation needs of breeding birds in the southern Appalachians.

Development of a historical chronology and research agenda for introduced flathead catfish populations in the southeastern United States
Objectives are to compile and summarize existing knowledge on the biology, ecology and social aspects of introduced flathead catfish populations and to develop a prioritized research agenda to guide the expansion and application of the knowledge base.

OTHER UNIT HIGHLIGHTS

Dr. Simons received the Cooperative Research Units national Leadership Award for initiating and building relationships with other DOI bureaus, state agencies and non-governmental organizations that extend beyond traditional geographic and demographic boundaries.

Wendy Moore (Program Assistant) was selected to participate in the PATHWAYS leadership development program designed to enhance Leadership skills and professional development.

Bill Pine (PhD student of Dr. Kwak) received honorable mention in Best Paper Published in the North American Journal of Fisheries Management award.

Oklahoma Cooperative Fish and Wildlife Research Unit

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Oklahoma Department of Wildlife Conservation
Wildlife Management Institute
U.S. Geological Survey

David Leslie *Unit Leader*
Terrestrial vertebrate ecology; biology and recovery of endangered species, particularly bats and interior least terns; cave conservation; nutritional ecology; transboundary conservation issues in Eastern Europe.

Dana Winkelman *AUL Fisheries*
Fish ecology, population dynamics, and management of fresh water fishes; how biotic and abiotic factors influence life-history strategies, population dynamics, and community structure; diverse projects on fish conservation and management issues

William Fisher *AUL Ecology*
Stream ecology, fisheries science, GIS applications in fisheries and wildlife. Research involves field studies coupled with species-habitat modeling for the conservation and management of riverine fisheries, rare and endangered species, and their habitats.

Research Highlights

Protection of endangered bats
Objectives include assessments of genetic structuring of endangered Ozark big-eared bats at maternity colonies and hibernacula and gating of cave-passages to eliminate human impacts and enhance recovery of big-eared, gray, and Indiana bats. Efforts assist objectives of the new Ozark Plateau National Wildlife Refuge in northeastern Oklahoma.

Stream fisheries management information system
Objective was to develop the Oklahoma Streams Information System (OSIS) to aid fisheries managers and fish biologists in managing the state's stream fisheries resources. The OSIS is a compilation of fish and fisheries collection data and stream and watershed characteristics in a geographic information systems (GIS) database.

Development of rapid bioassessment protocols for non-wadeable rivers
Objective is to develop a standardized sampling protocol for assessing fish assemblages in Oklahoma's non-wadeable rivers. Fish sampling techniques and methods are being tested at a study site on the Cimarron River and will be evaluated at several large rivers in Oklahoma.

Evaluation of hybrid bluegill for use in urban recreational fisheries
Objectives are to evaluate hybrid bluegill for use in recreational fishing clinics and managed pond fisheries. Hybrid bluegill are easy to produce, grow well in a pond environment, have high catch rates, and low catch-and-release mortality, making them ideal candidates for fishing clinics and catch-and-release management.

Colonizing Rocky Mountain elk
Objectives are to characterize demography, behavior, and nutrition of elk colonizing private lands surrounding the Wichita Mountains National Wildlife Refuge, which has managed an "enclosed" elk population since their reintroduction in southwestern Oklahoma in the early 1990s. The endpoint will be a detailed management plan focusing on future harvest and landowner concerns.

Evaluation of rainbow trout stocking on spring-fed Ozark Mountain streams
Objectives are to evaluate effects of rainbow trout stocking on native fish community structure and smallmouth bass populations in spring-fed stream ecosystems in northeastern Oklahoma and to estimate trout survival, growth, and movement. These data will be used to make management recommendations for trout stocking in Oklahoma streams.

Other Unit Highlights

Dr. Winkelman organized two workshops: Analyzing Electrofishing Data and Recreational Fisheries Pond Management. About 50 biologists from the region attended the electrofishing workshop. About 125 people attended the Pond Management workshop, including biologists and pond owners throughout Oklahoma.

Dr. Fisher co-organized the 2nd International Symposium on GIS Applications in Fisheries Science in Sussex, England. He is co-editor of the American Fisheries Society's book *GIS in Fisheries*, to be released in 2003.

Dr. Leslie completed a 4-year term as Editor of the *Journal of Mammalogy* and serves as Editor for Special Features and Chair of the American Society of Mammalogists' Publications Committee. He recently was approved for Patron Membership in the Society.

OREGON COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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WILDLIFE MANAGEMENT INSTITUTE
U.S. FISH AND WILDLIFE SERVICE
U.S. GEOLOGICAL SURVEY

Robert Anthony *Unit Leader Wildlife*
Population dynamics and habitat associations of wildlife with emphasis on sensitive and threatened species in coniferous forests and shrub steppe communities. Effects of environmental contaminants on birds and mammals. Wildlife population analysis. Dr. Anthony has served on the recovery teams for bald eagles and northern spotted owls.

Carl Schreck *Unit Leader Fisheries*
Environmental physiology including stress physiology and reproductive physiology of fish. Particularly, determination of effects of stress on fish performance in rivers, estuaries and hatchery environments. Areas of interest include fish health, migration and development. Studies include synecology, endocrinology, immunology, molecular genetics as well as behavior and toxicology

.

Hiram Li *AUL Fisheries*
Ecology of streams, fish communities and invasive species and high desert trout streams. Qualitative mathematical models for management of communities. Hierarchical perspectives of landscapes and riverscapes ("from macroscope to microscope"). Interdisciplinary Team Research.

Daniel Roby *AUL Wildlife*
Wildlife ecology and conservation, with emphasis on the physiological ecology of birds, particularly seabirds. Recent research addresses fisheries-wildlife interactions, oil spill damage assessment and restoration, effects of disturbance on ESA-listed birds, and seabird reproductive energetics and nutritional ecology.

RESEARCH HIGHLIGHTS

Demography of northern spotted owls in relation to vegetative characteristics
The project's purpose is to determine if reproductive rates and survival are related to vegetative characteristics around nest sites. The research involves modeling of reproduction and survival in relation to vegetative characteristics from aerial photographs and satellite imagery. The project goal is to predict demographic performance based on vegetation so monitoring of population status can be assessed.

Avian Predation on Juvenile Salmonids in the Lower Columbia River
Objectives are to quantify the effects of predation by Caspian terns, double-crested cormorants, and other piscivorous waterbirds on the survival of out-migrating smolts, with emphasis on ESA-listed salmonid stocks.

Migration and survival of salmonids in large and small river systems and estuaries
Experiences encountered in upper watersheds appear to affect the survival of the fish once they reach the ocean. Telemetry of fish populations suggests high survival of fish migrating long distances in river systems but mortality in estuaries and/or the near-shore area. Avian predators are a significant mortality factor. Physiological monitoring suggests variation in "quality" among groups of in-river migrants, and ramifications may be manifested hundreds of miles downstream.

Mathematical Community Models
We have improved the capacity of qualitative models to make accurate and reliable predictions of community structure responding to management policy. Direct and indirect interactions are used to determine community stability, population changes, population turnover and key interactions. When quantitative data are scant, descriptive information can be incorporated. The capacity to assess risk in the face of uncertainty makes it well suited for adaptive management.

OTHER UNIT HIGHLIGHTS

Dr. Anthony is Past-President of The Wildlife Society and a "Distinguished Alumnus" of the University of Arizona.

Drs. Schreck and Li serve on the Independent Multidisciplinary Science Team and the Independent Science Team, for Oregon and Washington, respectively.

Dr. Li's interdisciplinary modeling team, *the OSU Loop Group*, was presented with the Oldfield/Jackman Award for Team Research.

Dr. Roby is the Lead Technical Advisor for the Interagency Caspian Tern Working Group.

Pennsylvania Cooperative Fish and Wildlife Research Unit

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Signatory Cooperators
Pennsylvania State University
Pennsylvania Game Commission
Pennsylvania Fish and Boat Commission
Wildlife Management Institute
U.S. Geological Survey

Robert Carline *Unit Leader*
Freshwater fisheries management; stream ecology; reproductive ecology of salmonids; assessing effects of non-point source pollution on stream productivity.

Erin Snyder *AUL Fisheries*
Ecotoxicology; aquatic toxicology; effects of endocrine disrupting chemicals (EDC) on fish reproductive and thyroid systems, use of responses in fish to test for EDC (e.g., estrogenic chemicals, perchlorate) in sewage effluent or contaminated groundwater.

Duane Diefenbach *AUL Wildlife*
Estimation of population parameters, including empirical validation of statistical models and field techniques; population dynamics, especially as it relates to management of game species.

Research Highlights

Dispersal and breeding ecology of male white-tailed deer in Pennsylvania

Hunting regulations were adopted in Pennsylvania to reduce harvest rates of male deer. This study will assess effects of this demographic manipulation on socially influenced components of white-tailed deer ecology, specifically dispersal and breeding behavior of male deer. Although selective harvest strategies have been widely implemented across the U.S. and are generally popular among hunters, little research has examined their effects on deer sociobiology.

Use of Reclaimed Surface Mines by Grassland Birds: Identifying Strategies to Conserve and Manage Grassland Landscapes for Viable Songbird Populations

Grassland songbirds have declined dramatically nationwide, but reclaimed surface mines support substantial populations of obligate grassland songbird species. This research will quantify the characteristics of reclaimed surface mines that are related to the abundance of grassland songbirds to help managers identify reclaimed sites likely to have abundant grassland songbird populations and manage reclaimed sites as suitable habitat for grassland species.

Denning Ecology of Black Bears in Pennsylvania

Recent analyses of population estimates for black bears in Pennsylvania indicate that the timing of female denning affects estimates. The proportion of females denned varies considerably depending on the reproductive status of bears (pregnant or with cubs), food availability, and possibly weather. The purpose of this study is to obtain more information on factors influencing denning and using that information to improve the precision and accuracy of population estimates.

Response of Streams to Riparian Restoration

Objectives are to assess changes in water quality, channel morphology, macroinvertebrate communities, and fish communities in response to bank stabilization and fencing in two small, agricultural watersheds.

Impact of perchlorate on fish reproductive and thyroid systems

Perchlorate, a contaminant found in ground water and surface water, interferes with thyroid activity by blocking the uptake of iodide needed to synthesize thyroid hormones. Evidence of reproductive endocrine disruption has been documented in fish collected from areas of Lake Mead, Nevada-Arizona, that are contaminated with perchlorate and other pollutants. We are using a combination of field and laboratory studies to determine whether perchlorate can affect thyroid activity in fish, possibly resulting in reproductive effects.

Restoration of spawning habitat for trout

Objective is to identify impediments to trout spawning in a formerly productive reach of a limestone stream. In particular, we are investigating the nature and source(s) of fine material causing embedding of the stream substrate, chemical or physical causes of substrate cementation, and quality of overlying water and substrate interstitial water.

South Carolina Cooperative Fish and Wildlife Research Unit

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Signatory Cooperators
Clemson University
South Carolina Department of Natural Resources
Wildlife Management Institute
U.S. Geological Survey

Craig Allen *Unit Leader*
Expertise includes invasive species impacts, spatial modeling, cross-scale ecology and resilience in complex systems. Whether basic or applied, research often focuses on the relationship between landscape structure, biological invasions and extinctions.

Jeff Isely *AUL Fisheries*
Juvenile fish ecology, age and growth of fishes, microhabitat selection in reservoirs and rivers, movement and migration of anadromous and riverine species. Studies often incorporate advanced radio and sonic telemetry, and fish marking techniques.

Patrick Jodice *AUL Wildlife*
Primary focus is avian reproductive energetics and behavioral ecology, emphasizing foraging ecology, parental energy expenditure, and relationships of reproductive performance to diet quality. Also developing and evaluating long-term monitoring plans for T&E species.

Research Highlights

Ecological impacts of red imported fire ants

This project is quantifying the impacts of the non-native invasive red imported fire ants on native wildlife and ecological processes. Our objective is to determine which native species and processes (such as seed dispersal) are vulnerable to fire ant impacts, the severity of impact, and to determine the mechanisms of impact.

Improving vertebrate modeling in Gap Analyses

The objective of this project is to create methods of biodiversity modeling that accounts for the heterogeneous and scale dependent relationship between species and landscapes. These methods will demonstrate the usefulness of approaches that incorporate the consideration of minimum areas for viable populations, functional connectivity and critical patches of habitat.

Behavioral Comparison of Wild and Hatchery-Reared Shortnose Sturgeon

The use of surrogates in behavioral studies on endangered species may contribute significantly to recovery efforts. We are investigating the behavioral differences in hatchery-produced sterile fish for use in behavioral studies in the wild. Results of this study may impact reintroduction efforts for a number of fish species.

Effects of hydrology restoration and landscape pattern on amphibians in Carolina Bays on the Savannah River Site

This project examines the effects of hydrology and spatial context within a landscape of Carolina bays and neighboring wetlands on amphibian communities at the Savannah River Site. Variability in population and community parameters of amphibian species in healthy Carolina bay wetlands will be modeled for restoration, regeneration, and mitigation objectives.

Diet Composition, Reproductive Energetics, and Productivity of Seabirds Damaged by the *Exxon Valdez* Oil Spill

Our objective is to determine the effects of diet composition on the reproductive energetics and productivity of piscivorous seabirds in the northern Gulf of Alaska, using pigeon guillemots (*Cepphus columba*) and black-legged kittiwakes (*Rissa tridactyla*) as models.

Other Unit Highlights

Dr. Allen was a 2001 recipient of a 21st Century Research Award – Studying Complex Systems, James S. McDonnell Foundation. This award follows an international competition, with 5 awards annually to support novel research in Complex Systems, regardless of particular field of study.

Dr. Allen serves as Associate Editor for the journal Conservation Ecology (www.consecol.org/Journal/) and sits on the Board of Directors of the Resilience Alliance (www.resalliance.org).

Dr. Isely currently serves as President of the Early Life History Section of the American Fisheries Society, and is a member of the Executive Management Committee of the parent society.

Dr. Jodice is Chair of the Pacific Seabird Group's Publication Committee.

Dr. Quenton Fontenot, a recent Unit graduate was named Clemson Universities Outstanding Graduate Researcher in 2002.

SOUTH DAKOTA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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Signatory Cooperators
SOUTH DAKOTA STATE UNIVERSITY
SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE

Chuck Berry *Unit Leader*
River ecology, endangered species, catfish management and fish-habitat associations in the Missouri River

Steven Chipps *AUL Fisheries*
Fish invertebrate interactions in aquatic food webs, bioenergetic modeling, wetland bioindicators, and effects of winterkill on nutrient plankton dynamics in natural lakes.

Kenneth Higgins *AUL Wildlife*
Grassland fire ecology, grassland habitat enhancement and management, waterfowl and wetlands ecology, non-game birds, effects of wind turbines on birds and bats.

RESEARCH OVERVIEW

Northern Great Plains

Most of the Unit's research projects are field-oriented and are conducted by graduate students under the supervision of Unit scientists. Research is focused on fish and wildlife ecology in the Prairie Pothole Region of the upper Midwest, with an emphasis on ecosystem management in agricultural settings.

Recent Research - Fisheries

- Development and application of aquatic GAP analysis
- Topeka shiner population status
- Assessment of trophy catfish populations
- Limnology of Black Hills reservoirs
- Trophic position of Lake Oahe walleyes
- Biomonitoring criteria in floodplain wetlands

Recent Research – Wildlife

- Ring-necked pheasant abundance on CRP lands
- Survey of nongame birds in wetlands, grasslands and woodlands
- Bird communities in big sagebrush habitats
- Assessment of tallgrass prairie habitat in South Dakota
- Wild turtles of South Dakota
- South Dakota GAP analysis

GRADUATE EDUCATION

The Unit contributes to the quality education of graduate and advanced undergraduate fisheries and wildlife students at South Dakota State University by offering research assistantships and graduate training opportunities. Unit scientists teach several graduate level courses that include Advanced Limnology, Aquatic Invertebrate Ecology, Stream Ecology, Fish Physiology, Grassland Fire Ecology, Upland Game Ecology.

Annually, the Unit supports from 10-18 graduate students. Since its beginning in 1962, over 200 graduate students have completed M.S. or Ph.D. degrees through the South Dakota Coop Unit.

TECHNICAL ASSISTANCE & WORKSHOPS

Coop Unit staff provide technical assistance to natural resource agencies on a variety of issues. The Unit works with the SDSU Agriculture Extension Office by helping produce technical materials on fish and wildlife issues in South Dakota. Unit staff also provide continuing education workshops to cooperators.

UNIT HIGHLIGHT

Ken Higgin's book entitled "Mammals of South Dakota" placed 3rd in the Nation as a natural resource publication.

TENNESSEE COOPERATIVE FISHERY RESEARCH UNIT

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Signatory Cooperators
TENNESSEE TECHNOLOGICAL UNIVERSITY
TENNESSEE WILDLIFE RESOURCES AGENCY
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Jim Layzer *Unit Leader*
Influence of stream discharge and hydraulics on the distribution and abundance of aquatic organisms; ecology of freshwater mussels and imperiled fishes; propagation, culture and recovery of endangered mussels.

Phil Bettoli *AUL Fisheries*
Applied research into the dynamics of exploited fish populations and the prey they feed upon; environmental factors regulating the persistence of fish that are stocked to provide angling opportunities or augment threatened stocks; human dimensions and economic assessments of recreational fisheries.

RESEARCH HIGHLIGHTS

Dynamics of paddlefish stocks exploited for their caviar
The recent collapse of sturgeon stocks in Eurasia has increased pressure on paddlefish stocks in the U.S., particularly in Tennessee, which leads the country in the overseas export of paddlefish caviar. Our objectives are to estimate the size of exploited stocks in the Tennessee River and assess the likelihood that they are suffering from growth or recruitment overfishing.

Human dimensions and economic value of tailwater trout fisheries
Each year more than 1 million trout are stocked in regulated rivers in Tennessee to mitigate for lost fishing opportunities. Anglers contacted onsite at seven rivers provided information to estimate and compare the consumer surplus of these fisheries. Follow-up mail surveys provided data that are being used to define resource specialization by these anglers and their attitudes and motivations.

Factors regulating recruitment and stocking success of reservoir sportfishes
The relationships between reservoir hydrology and recruitment have been defined for several important sportfish species such as largemouth bass, crappies, and walleyes. Efforts are ongoing to identify the factors regulating stocking success in large systems by mass marking stocked fish using chemical immersion techniques.

Propagation and reintroduction of endangered mussels
The freshwater mussel fauna in the southeastern U.S. is at a crisis stage. Not only have many populations been extirpated but populations of some endangered species have declined to levels precluding successful reproduction. Several projects are underway to design indoor and outdoor systems to culture mussels and to enhance or reestablish population.

Relationship between stream discharge and dynamics of mussel populations
Investigations of mussel populations in regulated streams are providing information on the hydraulic variables and streambed characteristics that influence the distribution and abundance of mussels.

Imperiled Fishes
Separate studies are underway to define the critical habitat and ecology of populations of two threatened and endangered species, the Bluemask darter and the Barrens topminnow. Both species are severely restricted in their range in middle Tennessee. Both studies have involved extensive field work and laboratory experiments are underway to examine competitive interactions between topminnows and exotic fish species.

Recruitment of freshwater mussels
Many mussel populations in unregulated streams consist almost entirely of old individuals with little or no evidence of successful recruitment. This study is examining physical and chemical variables to determine if microhabitats are unsuitable for survival of juvenile mussels in these streams.

OTHER UNIT HIGHLIGHTS

The Tennessee Cooperative Fishery Research Unit consists of two Unit scientists, the Leader and Assistant Leader, a full time office manager, two research associates, three research technicians, and several hourly employees. We average 10-12 graduate students per year. Last year alone, the Tennessee Unit brought in over $400,000 in external funds that originated from federal, state, and non-governmental organizations.

TEXAS COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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Signatory Cooperators
TEXAS TECH UNIVERSITY
TEXAS PARKS AND WILDLIFE DEPARTMENT
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE

Nick Parker *Unit Leader*
Aquaculture, water reuse systems, production of warmwater fish, marine microalgae, nutrient recycling, integrated agriculture and aquaculture systems, bioinformatics, geographical information systems, Texas Gap Analysis, and remote sensing

Reynaldo Patino *AUL Fisheries*
Basic and applied interests in reproductive biology, endocrinology, and toxicology. Also, stress physiology. Most studies are conducted with fishes, but some research also targets other vertebrates.

Clint Boal *AUL Wildlife*
Avian ecology, habitat relationships, community ecology, non-game wildlife.
Primary focus: ecology, resource selection and partitioning of predatory birds and how land-use management decisions influence wildlife populations.

RESEARCH HIGHLIGHTS

Management of the physiological stress response of juvenile largemouth bass as a means to improve the efficiency of stocking efforts in Texas reservoirs
Objective is to determine the effects of handling procedures on the stress response of juvenile largemouth bass and the association of this response with measures of performance such as predator avoidance success.

Characterization of a new integrative model of hormonally induced ovarian follicle maturation and ovulation in fishes
Objective is to evaluate the validity of a new heuristic model that integrates knowledge of the hormonal regulation and mechanisms of oocyte maturation and ovulation. Applications include the development and optimization of reproductive technologies.

Texas GAP Analysis
Objectives are to develop statewide databases for the Texas GAP Project. Geographic Information System data have been developed to identify areas in the state that support 631 species of terrestrial vertebrates. The vertebrates databases include habitat information on native species that breed in Texas.

Landscape fragmentation in Texas: 1850 – 2000 with projections to 2030

Landsat images, interpreted to define landcover as part of the Texas GAP Analysis Project, were the base used to examine croplands and urban areas in Texas from 1850 through 2000, with projections to 2030. Agricultural statistics and Census Bureau data were placed in a GIS to model land use yesterday, today, and to make projections for tomorrow when the Texas population is projected to double to 42 million.

Resource Partitioning of Raptor Assemblages in Prairie Grasslands
Objective is to understand how anthropocentric landscape changes influence presence of sympatric, high trophic level avian predators and their competition for, and partitioning of, habitat resources in prairie grasslands.

Playa Lakes as Habitat for Black-Tailed Prairie Dogs
Objective is to understand how playa lake areas may be managed as habitat reserves for prairie dogs and the many species associated with prairie dog colonies in rangeland that is extensively converted to agricultural production.

OTHER UNIT HIGHLIGHTS

Dr. Patiño has been detailed to the National Science Foundation as rotating program director for Integrative Animal Biology.

UTAH COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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Signatory Cooperators
UTAH STATE UNIVERSITY
UTAH DIVISION OF WILDLIFE RESOURCES
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY
U.S. FISH AND WILDLIFE SERVICE

John Bissonette *Unit Leader*
Research interests include landscape ecology, responses of terrestrial species to disturbances, wildlife management, and the effects of roads on species and biodiversity. Emphasis on larger scale studies with large mammals and carnivores. Currently teaching a course in Landscape Ecology

Phaedra Budy *AUL Fisheries*
Research interests include fisheries conservation, population assessment, and trophic dynamics of aquatic systems. Interested in both lakes and streams and have experience working both on fisheries questions and modeling as well as lake limnology or habitat questions. Currently teaching a course in Population Assessment

Thomas Edwards *AUL Wildlife*
Research interests includes bioregional conservation planning, the development of methods for assessing and monitoring biological diversity at large landscape scales, and modeling strategies for wildlife in forest systems in the US Intermountain West. Currently teaching graduate level classes in The Design and Analysis of Ecological Research, and Topics in Spatial Ecology

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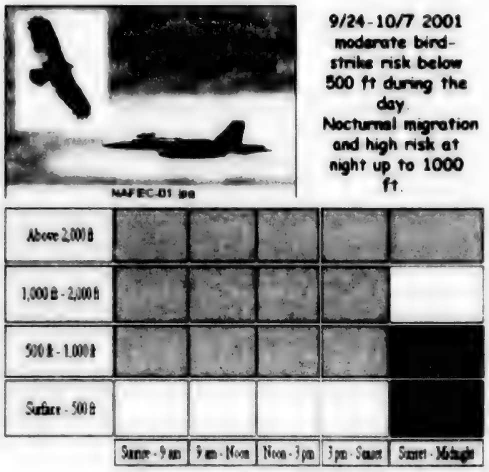
RESEARCH HIGHLIGHTS

Development of a Bird-Avoidance Model for Naval Air Facility, El Centro, CA -JAB-

We provided the Department of Defense with a model that assessed the risk of a damaging bird strike at the El Centro airfield. To do this we assessed the probability of a hazardous bird strike over time and space. The model was put in CD-Rom format accessible to flight schedulers, flight crews, control-tower personnel, range controllers, safety officers and natural resource managers.

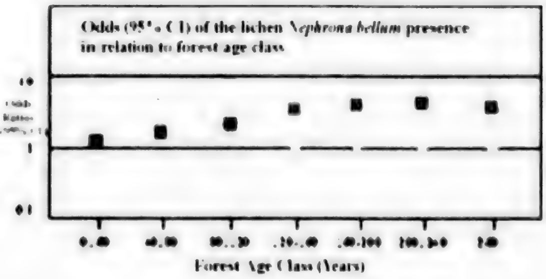


9/24-10/7 2001 moderate bird-strike risk below 500 ft during the day. Nocturnal migration and high risk at night up to 1000 ft.

	Sunrise - 9 am	9 am - Noon	Noon - 3 pm	3 pm - Sunset	Sunset - Midnight
Above 2,000 ft	▨	▨	▨	▨	▨
1,000 ft - 2,000 ft	▨	▨	▨	▨	
500 ft - 1,000 ft	▨	▨	▨	▨	■
Surface - 500 ft					■

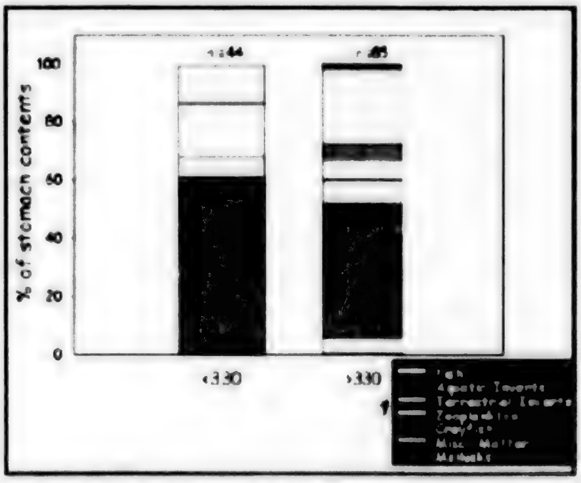
Design And Analysis Strategies For Rare Ecological Events -TCE-

Sample design and analytical strategies for rare ecological events, such as many species of lichens, bryophytes and fungi, are hampered by issues of detectability. Working with multiple agencies in the context of the Northwest Forest Plan, we developed, evaluated and implemented a sampling strategy across 23 million ha of public lands to inventory and assess distribution and abundance patterns of >350 rare plant species



Rainbow trout growth and survival in Flaming Gorge Reservoir -PB-

The objectives were to identify factors limiting growth and survival of stocked rainbow trout



Vermont Cooperative Fish and Wildlife Research Unit

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Signatory Cooperators
University of Vermont
Vermont Department of Fish and Wildlife
Wildlife Management Institute
U.S. Geological Survey

Donna Parrish *Unit Leader*
Fish ecology; lake and stream fish community structure and function; multi-scaled habitat requirements, especially in salmonids; bioenergetics; and acoustics.

Terri Donovan *AUL Wildlife*
Landscape ecology; conservation biology; population dynamics and modeling of migratory songbirds and mammals in response to habitat fragmentation.

Research Highlights

Atlantic salmon of the Connecticut River
Objective is to develop a population model that will be useful in exploring various stocking and restoration strategies for Atlantic salmon in Vermont tributaries of the Connecticut River. Two example scenarios are: 1) If we increase the survival of 0 to 0+ salmon by 10%, what is the effect on the number of smolts migrating? 2) What are the effects of increasing survivorship at other life stages (0+ to 1+, 1+ to 2+) on smolt survival in river, or on number of adults returning?

Effects of landuse patterns on songbird distribution and viability
Two current studies evaluate how birds choose between high and low quality habitats in a landscape context, and identify the consequences of such choices at a population level. Forest nesting birds such as the Black-throated blue warbler readily nest in poor quality fragmented landscapes, while grassland songbirds such as Bobolinks readily nest hayfields that are mowed before young can fledge. These studies evaluate the mechanisms of habitat selection, and identify how much high quality habitat must be maintained for populations to remain viable.

Model selection approach to understanding decline of a brown trout population
Preliminary analysis of electrofishing survey data indicate that increasing survival of subadults and adult fish in the population will provide more population benefits than increasing spawning or first-year survival. Model selection will be used to weigh support in the data for a set of candidate models representing temporal change in survival rates. Decision analysis will be used to explore management options for reversing the decline in the numbers of brown trout in the famous Batten Kill.

Impacts of landuse change on Vermont's biodiversity
A large-scale, coordinated biodiversity assessment began in 2002, in which selected mammals, birds, and herps are surveyed at 180 study sites throughout Vermont. Habitat models that link the occurrence of a species to landscape level habitat features allow identification of biodiversity "hotspots." These models will be applied to land use change models that project how the Vermont landscape will change over time, allowing quantification of species loss in response to land use change.

Population dynamics of rainbow smelt
Conducted smelt stock assessment and determined spatial distributions of smelt using hydroacoustics and midwater trawling and modeled smelt cannibalism. An efficient sampling design for doing acoustic surveys of Lake Champlain will be developed. Modeling components can be used by management to predict effects of increasing salmonid predation.

Dispersal, diets, and movements of Double-Crested Cormorants
Cormorant populations in Lake Champlain have been increasing exponentially and now number over 6000 breeders. In response to the "cormorant problem," State wildlife biologists have been oiling eggs on Young Island to limit reproduction. This study evaluates how such management alters the movements, diets, and the dynamics among colonies within the Lake.

Other Unit Highlights

Dr. Donovan published two books that teach students and practitioners basic concepts in modeling: Spreadsheet Exercises in Ecology and Evolution, and Spreadsheet Exercises in Conservation Biology and Landscape Ecology. Both books are coauthored by Charles Welden.

Angelo Incerpi, Director of Operations for Vermont Fish and Wildife, retired in September. Angie was a major supporter of the Unit since its establishment. He will be missed at future cooperator meetings.

VIRGINIA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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Signatory Cooperators
VIRGINIA POLYTECHNIC INSTITUTE
VIRGINIA DEPARTMENT OF GAME AND INLAND FISHERIES
WILDLIFE MANAGEMENT INSTITUTE
U.S. FISH AND WILDLIFE SERVICE
U.S. GEOLOGICAL SURVEY

Richard Neves *Unit Leader*
Biology and conservation of freshwater mussels; endangered aquatic species; restoration and recovery of aquatic ecosystems; propagation of endangered mollusks

Paul Angermeier *AUL Fisheries*
Stream fish communities; assessing quality of aquatic resources; conservation of aquatic systems

Michael Vaughan *AUL Wildlife*
Population ecology; large animal population dynamics; predator/prey interactions

RESEARCH HIGHLIGHTS

Technology development for mussel propagation and release of juvenile mussels
Objectives are to identify fish hosts for endangered mussels without known hosts, improve propagation techniques by testing various water quality and food parameters, and release propagated mussels in Virginia and Tennessee and monitor survival success. The Unit has already produced, cultured, and released more than 330,000 endangered juvenile mussels of 9 species into tributaries of the upper Tennessee River system in Virginia and Tennessee.

Landscape-scale models of fish distribution in Virginia
Objectives are to examine 2 primary areas; how sampling effort in a particular region affects estimates of species composition for unsampled localities, and which unsampled localities can selected species be expected to occur in.

Population and habitat ecology of Virginia's exploited black bear population
This is commonly referred to as the Cooperative Alleghany Bear Study (CABS). Objectives are to develop an understanding of the dynamics of Virginia's hunted black bear population that will enable wildlife managers to evaluate and predict population trends, and to effectively manage the population.

UNIT HIGHLIGHTS

The Unit produced and published a full-color children's storybook entitled 'Russell the Mussel', for distribution to grammar schools and resource agencies in the eastern United States.

Dr. Neves was elected President of the Freshwater Mollusk Conservation Society for 2002-2003 and was appointed by the governor to serve for 5 years on the Board of Trustees for the Virginia Natural History Museum.

Dr. Angermeier serves on a panel of national scientists to advise the state of California on the restoration of the San Francisco Bay-Delta ecosystem.

Dr. Vaughan is on the Scientific Review Team for the endangered Florida Panther.

Colleen Olfenbuttel (Master's student of Dr. Vaughan) won Best Presentation at the 14th International Conference on Bear Research and Management in Steinkjer, Norway.

WASHINGTON COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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Signatory Cooperators
UNIVERSITY OF WASHINGTON
WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
WASHINGTON DEPARTMENT OF NATURAL RESOURCES
WASHINGTON DEPARTMENT OF ECOLOGY
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Chris Grue *Unit Leader*
Terrestrial/aquatic toxicology; effects of pesticides, herbicides and surfactants on fish/wildlife and their habitats; physiological and behavioral effects of cholinesterase inhibitors; constraints on salmon restoration efforts; integrating biodiversity and land-use planning

David Beauchamp *AUL Fisheries*
Fish ecology; aquatic food web dynamics in lakes, reservoirs, estuaries, and marine systems; bioenergetics and foraging models; acoustics; distribution and movement patterns at different temporal scales, impacts of nonnative species, and life history strategies.

Glenn VanBlaricom *AUL Wildlife*
Research focuses on coastal marine ecosystems and includes: community ecology and conservation biology of marine mammals and other vertebrates; interactions of natural and anthropogenic disturbances; and the effects of harvesting living marine resources.

RESEARCH HIGHLIGHTS

Effects of predation by harbor seals on depleted salmon stocks in Puget Sound, Washington

Objectives are to determine the aggregate effect of harbor seal predation on certain spawning runs of salmon, and to identify which individual seals, and which categories of age and sex in seals, are most responsible for measured effects on salmon population size and dynamics.

Non-target effects of herbicide tank mixes on estuarine invertebrates and juvenile salmonids

Objectives are to determine the effects of aquatic herbicides and surfactants on the embryogenesis of Pacific oysters, survival, and sea-water adaptability of juvenile salmonids. Results indicate surfactants can be orders of magnitude more toxic than active herbicidal ingredients and some can interfere with the physiological parameters associated with smoltification in juvenile salmonids.

Direct and indirect effects of *B.t.i.* on the invertebrate communities within treated wetlands

With the rapid spread of the mosquito-borne West Nile virus, wetland managers are being pressured to aggressively control mosquitoes. Studies have shown that the bacterial larvicide *Bacillus thuringiensis* var *israelensis* (*B.t.i.*) has a low toxicity to fish. However, the potential for indirect adverse effects to fish from disruption of the food web is much greater. Beginning in 2003, the Unit will study the effects of *B.t.i.* treatments on the Franz Lake National Wildlife Refuge.

Temporal distribution and trophic interactions during the early marine life history of salmon in Puget Sound

Objectives are to examine temporal distribution, diet, size and growth patterns for juvenile salmon in estuarine and nearshore marine areas of Puget Sound. Changes in diet and feeding rates will be used to evaluate effects of environmental conditions, predation, and competition on survival and growth of juvenile salmon in these areas.

UNIT HIGHLIGHTS

Dr. Grue and his colleagues wrote the lead chapter for *Behavioural Ecotoxicology* edited by Dr. Giacomo Dell'Omo at the Istituto Supoeriore di Sanit in Rome, Italy, recently published by Wiley & Sons Ltd. He has been invited by Taylor & Francis Publishers to edit *Avian Toxicology* with publication slated for 2004.

Dave Beauchamp ran a 5-day short-course on "Bio-energetic modeling of lake food webs" in Bariloche, Argentina, November 4-8, 2002.

Former student, Dr. Carlos Alvarez-Flores, received the prestigious Faculty Merit Award from the School of Aquatic and Fishery Sciences, University of Washington.

Dr. VanBlaricom was invited to give the opening plenary presentation at the Tenth South American Meeting of Marine Mammal Specialists, held 14-19 October 2002 in Valdivia, Chile.

Dr. VanBlaricom participated in a multi-national research team involved with attaching satellite telemetry tags to humpback whales off Brazil, with the goal of improving the understanding of migratory corridors in the whales.

West Virginia Cooperative Fish and Wildlife Research Unit

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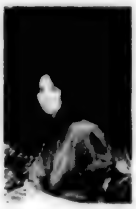
Signatory Cooperators
West Virginia University
West Virginia Department of Natural Resources
Wildlife Management Institute
U.S. Geological Survey
U.S. Fish and Wildlife Service

Patricia Mazik *Unit Leader*
Fish stress physiology and toxicology. Research includes studies in effects of aquaculture-related stressors on fillet texture and quality in trout, brook trout restoration in Appalachia and state-wide contaminant determinations.

Stuart Welsh *AUL Fisheries*
Fish ecology, zoogeography, species-habitat relationships. Research includes studies of habitat use, zoogeography, and systematics of fishes within the Appalachian region, and survival and migration of Atlantic striped bass



Petra Wood *AUL Wildlife*
Wildlife habitat relationships, particularly effects of anthropogenic disturbances (timber harvesting, mining, recreation, development) on wildlife populations (songbirds, raptors, mammals, herpetofauna) at local and landscape scales. Raptor ecology and management.

Research Highlights

Mountaintop Mining Studies

Objectives have been to examine response of various terrestrial wildlife populations to microhabitat and landscape-level changes from mountaintop mining. We have studied the overall avian community, cerulean warblers, grasshopper sparrows, small mammal community, terrestrial herpetofaunal community, and stream salamanders.

Wildlife Response to Timber Harvesting on an Industrial Forest

Objectives are to quantify the response of songbird, raptor, and meso-mammal (focused on raccoons) populations to various levels of harvesting intensity on an intensively managed industrial forest.

Habitat use and distributions of the Elk River crystal and spotted darters

Objectives are to determine distributions of crystal and spotted darters in the Elk River, and examine habitats used by these rare fishes. These taxa were recently discovered in the Elk River, and habitat data will supplement systematic studies and be useful for management plans.

Effects of water quality and stress on rainbow trout fillet texture and quality

Objectives are to determine the effects of water quality (CO_2, flow, nitrite and ammonia) and stress on fillet texture and quality.

Restoration of a native brook trout fishery in West Virginia

Objectives are to assess brook trout populations, habitat and invertebrate populations and the effect of limestone treatments on the populations.

West Virginia statewide contaminant analysis

Objectives include determining mercury and PCB levels in fish throughout the state, writing the state's sportfish contamination advisory guide, and determine the effects of gender, season and species on contamination levels in fish tissue.

Other Unit Highlights

Dr. Welsh was elected as chair of the Striped Bass Tagging Committee, Atlantic States Marine Fisheries Commission.

Doctoral students Frank Ammer, Rachel Dellinger, and Gary Williams (students of Dr. Wood) received student travel grants from WVU to participate in the 3rd North American Ornithological Conference held Sept 24-28, 2002 in New Orleans, LA. Ammer and Williams also received competitive travel grants from the ornithological societies hosting the conference.

Dr. Mazik was elected Vice President of the Southern Division of the American Fisheries Society and she is the current President-elect of the WV Chapter of AFS.

WISCONSIN COOPERATIVE FISHERY RESEARCH UNIT

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WISCONSIN DEPARTMENT OF NATURAL RESOURCES
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Mike Bozek *Unit Leader*
Fish habitat analysis, design and modeling (lentic and lotic environments), population dynamics, fish ecology, multivariate statistics, and Paleontology

Brian Sloss *AUL Fisheries*
Conservation genetics, phylogenetics, and the application of genetic markers to fisheries management issues. Other interests include the development of novel genetic systems for use in management of aquatic resources and examination of species boundaries.

UNIT HIGHLIGHTS

Michael Bozek received the University of Wisconsin Scholar Award for outstanding scholarship in Fisheries and Aquatic Sciences research.

Brian Sloss is director of the newly created Conservation Genetics Lab at the University of Wisconsin-Stevens Point comprised of state-of-the-art molecular equipment necessary to address a wide array of aquatic and terrestrial conservation genetics issues.

RESEARCH HIGHLIGHTS

Fish Habitat Modelling

Objectives are to link fish habitat quantity and quality to measures of production in fish to elucidate the functional response of fish to habitat, a necessary prerequisite to understanding success of habitat management projects. Current projects focus on habitat of smallmouth bass in north temperate lakes.

Modelling Sustainable Linkages Between Riparian Areas and Littoral Zone Habitats

Objectives are to develop a dynamic model linking riparian land use practices with sustainable recruitment of woody habitat to lakes for fish habitat. Specific projects evaluate relations between fish and structural complexity of submerged trees, decay rates of submerged trees, transport processes, and forest stand dynamics. The model will forecast effects of various land use alternatives to sustainable recruitment and retention of trees to lakes.

Habitat Quality Index

Objectives are to quantify and classify littoral zone habitats in relation to structure, function, and sensitivity to disturbance at site-specific and whole-lake scales. The index provide quantitative guidance for protecting and restoring littoral zone habitats.

Genetic Integrity of Walleye in Northern Wisconsin Waters: Temporal Genetic Studies of Walleye in Escanaba Lake

Objectives are to use archived scale samples (50+ years) and microsatellite DNA loci to examine temporal genetic stability of walleye population and the within-generation variability as partitioned into year classes of walleye. Knowing the temporal stability of walleye in relation to previously identified population dynamics will enable us to interpret the impact of exploitation on the genetic structure of a naturally-reproducing walleye population. Knowledge of the intra-generational partitioning of genetic diversity will be useful for interpreting genetic impact of population fluctuations and recruitment patterns.

Detection of Differential Gene Expression in Brook Trout

Objectives of this research are to identify genes that appear to have differential expression in stream-resident brook trout and coaster brook trout at various stages of development and to identify polymorphic protein-coding genes within brook trout. Knowledge of differences in proteins and protein expression within the different forms of brook trout can be used to better understand how and why coaster brook trout exist and how we can more efficiently rehabilitate coaster brook trout in the Great Lakes.

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WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Chris Ribic *Unit Leader*

Vertebrate ecology, spatial ecology, statistics. Research interest is conservation and management of wildlife at a landscape-scale, particularly in agricultural landscapes. International activity includes research in Antarctica.

RESEARCH HIGHLIGHTS

Landscape-Scale Management of Grassland Bird Populations in Wisconsin

The objective of this study is to identify which habitat type or types are most beneficial to grassland birds in southwestern Wisconsin, and what features of the landscape influence habitat use and productivity of a patch. The study area is one that may be targeted for extensive prairie restoration. In general, we will address ecological issues involved in answering the question: What habitat type (or types) should be planted or maintained, and where in the landscape, until prairie restoration can take place? Many aspects of habitat selection, productivity and predation are included under this umbrella question, and must be addressed before it can be answered. A second project will be to understand the relationships between the predator community and grassland bird productivity, investigating the relationships between predator use of habitat patch edges, broader landscape characteristics, and grassland bird nesting success. The objectives of this project is to identify the predator community and determine its distribution around grassland edges and in the landscape.

Grassland Bird Populations at Fort McCoy Military Base, Wisconsin

Fort McCoy Military Base in Wisconsin is approximately 60,000 acres in size. Inside the borders of Fort McCoy, there are approximately 8900 acres of grasslands, oak savanna, and other open areas. This amount of acreage is significant not only for Monroe County where Fort McCoy is located, but also for the state of Wisconsin. Our objective was to document the bird community in the grasslands at Fort McCoy. We documented 29 bird species on the grassland areas; thirteen were Wisconsin grassland bird species of management concern. We observed 114 different species on Fort McCoy as a whole. Grassland bird nests were found and monitored. The major sources of mortality were predation and weather. Mortality due to military disturbance varied by area.

The Ecology of Chronic Wasting Disease in White-tailed Deer in Wisconsin

Little is known about how CWD will spread among white-tailed deer or what long term effect this disease will have on a herd of approximately 1.5 million animals. In coordination with the Wisconsin Department of Natural Resources, the objectives are to determine the spatial distribution of CWD in the Eradication Zone, determine the age/sex/clinical relationship of deer to prevalence of disease, determine the vulnerability of CWD infected deer to harvest, and evaluate how and when CWD is transmitted within and among social groups of white-tailed deer.

OTHER UNIT HIGHLIGHTS

Dr. Ribic was part of the interagency data analysis group and research subteam that was formed to give advice on early CWD management actions.

WYOMING COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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WYOMING GAME AND FISH DEPARTMENT
WILDLIFE MANAGEMENT INSTITUTE
U.S. GEOLOGICAL SURVEY

Stanley Anderson *Unit Leader*
Avian ecology, endangered species management. Emphasis on impacts of environmental alterations, especially in grassland and sagebrush biomes. Emphasis on relating biotic and abiotic factors to the occurrence and abundance of species.

Wayne Hubert *AUL Fisheries*
Fish ecology and management, focus on native fishes of the Intermountain West and Great Plains, especially streams. Emphasis on how human alteration of watersheds impact fishes and identification of alternatives to preserve and enhance native fish communities and sport fisheries.

Fred Lindzey *AUL Wildlife*
Large carnivore population ecology, ungulate populations and habitat use emphasizing the effects of disturbance to the landscape by humans. Focusing on effects of oil and gas development and rural subdivision on migratory patterns and winter habitat use, by impact and effects of hunting on the population dynamics and movements of cougars.

RESEARCH HIGHLIGHTS

Creating wetlands for waterfowl in Wyoming.
The purpose of several research projects in the arid Great Plains region of northeastern Wyoming has been to develop methods to construct and maintain wetlands for waterfowl. These projects have yielded engineering designs and understanding of biotic, processes useful to managers concerned with mitigation, enhancement, and development of wetlands in the region.

Factors affecting overwinter survival of stocked trout in tailwaters.
The purpose is to develop a comprehensive understanding affecting the overwinter survival of trout in Wyoming tailwaters and provide management alternatives for these systems. Several graduate-student projects provide insight into the relative and cumulative effects of water temperature, ice processes , starvation, water level fluctuation, and fish stocking practice on the overwinter survival of juvenile trout among tailwaters. Strategies for managing winter flows and the size and timing of stocking to optimize survival have emerged.

Cougar ecology and management.
The purpose of this research is to develop measures to evaluate population performance, develop methods to estimate population size, and describe the genetic characteristics of regional and local populations.

Migrations and winter-range use by ungulates in northwestern Wyoming.
Objectives were to identify seasonal movements and winter habitat use by mule deer and pronghorn in an area experiencing increased human residential and oil and gas development. The research identifies migration corridors and allow state and federal resource agencies and NOAA to protect these movement pathways into the future.

UNIT HIGHLIGHTS

Dr. Anderson served as president of the Wyoming Chapter of The Wildlife Society and was recognized for his long-term contributions.

Daniel Isaak (Ph.D. student of Dr. Hubert) was recognized for the outstanding dissertation in the Biological Sciences at the University of Wyoming for 2000-2001.

Chuck Anderson (Ph.D. student of Dr. Lindzey) received the best student paper award at the annual meeting of the Wyoming Chapter of The Wildlife Society.

HONORS AND AWARDS

2001 Outstanding Professionals Award given by The New York Chapter of the Wildlife Society (Richmond).

35 Year Membership Award given by American Statistical Association (Burnham).

Best Paper Award given by Kansas Chapter of the American Fisheries Society Annual Meeting (Quist).

Best Poster Award given by Kansas Chapter of the American Fisheries Society Annual Meeting (Quist).

Best Presentation Award-14th International Conference on Bear Research and Management given by International Bear Association (Vaughan).

Best Student Paper given by Oklahoma Chapter of the American Fisheries Society (Walsh).

Best Student Paper (Co-Winner) given by Tennessee Chapter, American Fisheries Society (Surgenor).

Best Student Paper (Co-Winner) given by Tennessee Chapter, American Fisheries Society (Williams).

Best Student Paper Award given by Kansas Ornithological Society (Jensen).

Best Student Presentation given by Pennsylvania Chapter, American Fisheries Society (Crouch).

Best Student Wildlife Poster, Midwest F&W Conference given by Iowa DNR (Fletcher).

Board of Governors, elected to 3-year term on executive body of international scientific and conservation organization given by Society for Conservation Biology (Thompson).

College of Forest Resources/Forest and Wildlife Research Center Award for Excellence given by Dean/Director CFR/FWRC Mississippi State University (Vilella).

Don Baker Memorial Award for Best Presentation, 2001, Annual Meeting of the North Carolina Chapter of the American Fisheries Society given by NC Chapter American Fisheries Society (Kwak).

Elected President, Graduate Faculty Senate given by Graduate Faculty Senate (Drobney).

Fulbright Scholarship given by Fulbright Scholarship (Dierking).

Invited to give Plenary Lecture given by 9th IberoAmerican and Spanish Ethological Conference (Martin).

Invited to give Plenary Lecture given by 3rd North American Ornithological Congress (Martin).

Invited to sit on international panel for FECYT-Fundacion Espanola para la Ciencia y la Tecnologia given by Spanish Secretary of State for Science and Technology (Martin).

Maine Governor's Teamwork Award given by Govenor King, and Maine Department of Conservation (Krohn).

Nominated, Faculty Alumni Award given by Faculty (Drobney).

Outstanding Contribution to Career Development of Students given by University of Georiga (Jennings).

Outstanding Professional Award (2001) given by The New York Chapter of The Wildlife Society (Malecki).

Outstanding Student Paper given by American Fisheries Society and Sea Grant (McHugh).

Outstanding Student Paper Award given by Annual Fall Meeting of the Kansas Ornithological Society (Jensen).

Professional of the Year given by Maryland/Delaware Chap of The Wildlife Society (Bounds).

Student of the Year Award given by Maryland/Delaware Chapter of The Wildlife Society (Daugherty).

Animal Biodiversity Surveys and Monitoring

The first phase of the Fishes of West Virginia Geographic Information System Database was completed. Geographic data on fish distributions were compiled into one database, and will be used by state and federal agencies for management decisions. (WV-Welsh)

Completed the South Dakota Gap Analysis Project. The project was the first in the nation to include both terrestrial and aquatic analyses, producing a geographic approach to planning for biological diversity. Overall 25 of 455 vertebrate species were protected in 10 of their ranges. (SD-Berry)

Assessed nearshore habitat use by juvenile and adult loggerhead, green, and kemp's ridley sea turtles in Northwest Florida. This work will be used by the State of Florida who sponsored this study. (FL-Carthy)

Worked in cooperation with the National Park Service (NPS) to develop the NPS Prairie Cluster Long-term Monitoring Program. University and Unit scientists have been involved with a statewide effort to develop protocols for monitoring prairie streams. This research has resulted in new understandings of streams in the prairie region of the USA--an area where streams have been little studied and rarely monitored for biological condition. (MO-Rabeni)

Gathered data on nesting success and habitat of birds using standardized sampling protocols among sites across North America. An integrated database was produced and these data are being provided on a web site for use by land managers to assess health of bird populations on their management units. This database also continues to be expanded and used by personnel from numerous agencies to explore habitat influences on population health at multiple spatial scales. (MTW-Martin)

Developed biological indicators for floodplain wetlands in the upper Missouri River basin. Comparison of reference and impaired wetlands yielded six indicators that were useful for assessing ecological integrity of floodplain wetlands. Results have important implications for conservation and human health issues and will be used by EPA and other federal agencies, as well as state agencies. (SD-Chipps)

Conducted surveys of aquatic invertebrates and amphibians in the Cottonwood Lakes region of North Dakota. Results of surveys contributed to a long-term GIS database established and maintained by BRD that will be incorporated in national GAP Program efforts. (CA-Duffy)

Developed sampling strata for stream-dwelling bull trout to improve accuracy and precision of estimates. The strata were used by USFWS personnel when developing a sampling protocol implemented during the summer 2002. (GA-Peterson)

Biometrics and Modeling

Developed a Geographic Information Systems (GIS) decision support tool, known as Gap Ecosystem Data Explorer for use in the Roanoke-Tar-Neuse-Cape Fear Ecosystem. The tool uses NC Gap Analysis vertebrate species data and a variety of other spatial data to allow area-specific inquiries about species ranges, predicted distributions, and conservation status. The Natural Heritage Program and the Virginia Gap Analysis Project were two of the partners in the development of the core data layers. The system will be used by the USFWS and state agencies for development and environmental planning in the ecosystem. (NC-Collazo)

Assessed methods for testing the reliability of wildlife occurrence models used in Gap Analysis. The assessments and new methods developed will be used by the national Gap Analysis Program to further define spacially explicit models of species occurrences. (ME-Krohn)

Developed analytical approaches to assessing recovery options for Snake River chinook salmon. Report will be used to provide scientific background to USFWS officials, in regard to decisions pertaining to the future management of the Columbia Basin Federal Hydrosystem. (UT- Budy)

Detailed how model and sampling inferences can be combined to estimate bull trout presence. The USFWS will use identified methods to determine more cost efficient and effective sampling strategies for bull trout. (GA-Peterson)

For the Newfoundland Model Forest in Corner Brook, we developed a spatial model for marten that allows exploration into the capacity of the landscape to support marten and allows assessment of habitat management needs to sustain marten populations (UT-Bissonette)

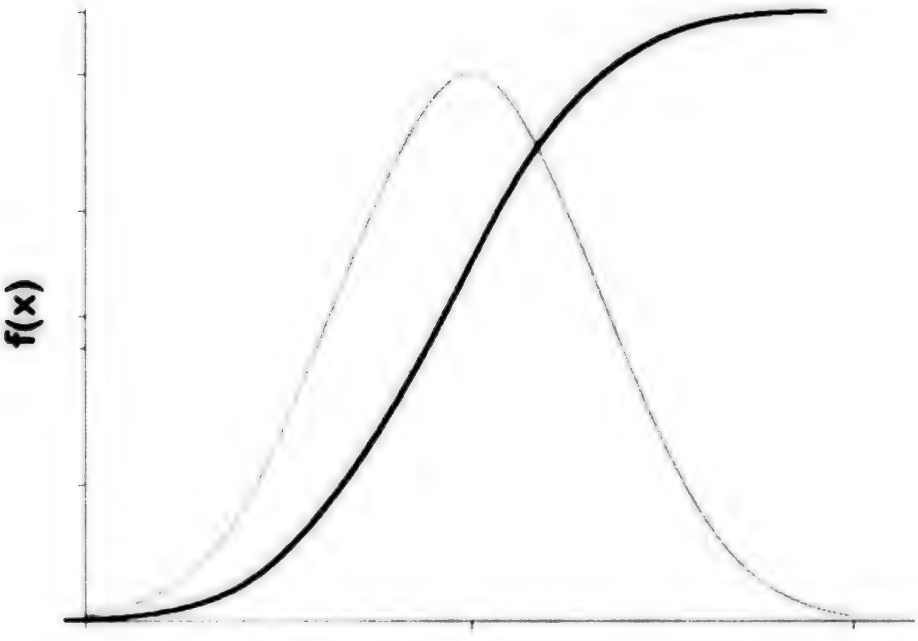
Completed development of three statewide GIS databases as part of national GAP Program. The layers developed reveal species that are under-represented in the conservation network of lands, include landcover map with over 60 cover types, include the National Wetland Inventory data in a standard format for use in statewide efforts, and contains biological, range, and distribution models for over 400 terrestrial species that breed in North Carolina. (NC-Collazo)

Used a spatially explicit source-sink model to project Bachman's sparrow populations in longleaf pine stands on the Conecuh National Forest, Alabama, USA, and examined the influence of prescribed, controlled forest fires on Bachman's sparrow abundance. Results suggest that frequency of prescribed fire can have a large effect on some songbird populations in longleaf pine forests. (AL-Grand)

Evaluated the adequacy of the vegetation monitoring program for Shenandoah National Park and found that some aspects of the monitoring program were not meeting stated objectives. NPS will use the reported findings as the basis for developing a revised sampling program to monitor vegetation changes in the park. (PA-Diefenbach)

Developed a system for incorporating recapture records into the databases managed by the Bird Banding Laboratory. The system developed will guide implementation of a recapture database that will integrate these data and will greatly expand the information resources used to estimate demographic parameters for birds in North America. The system and its associated outputs will be used by numerous national and international agencies involved in waterfowl conservation and mangement. (GA-Conroy)

Produced a predictive habitat model for the endangered aplomado falcon in the northern Chihuahuan Desert of southern New Mexico, western Texas, and Chihuahua, Mexico. The spectral- and GIS-based habitat model identifies relative suitability of areas as places of promise for conserving and restoring habitat for this falcon. This information is being used by the BLM, multiple military installations, and the U.S. Fish and Wildlife Service to make sound conservation recommendations. (NM-Browning, Gould, Hodgson, Lanser, Thompson, Valdez, Young)



Ecosystem Management

Digitized land cover types, plant and animal distributions, transportation corridors and other natural resource and socioeconomic data to develop a conservation plan for Latah County Idaho. The information was presented to members of the public and Idaho Department of Fish and Game, National Resources Conservation Service Nez Pearce Tribe, private consultants, teachers, Latah Soil and Water conservation District, Latah County Planning and Zoning Office. This was the first ever coming together of these diverse groups to collaborate on management of thee counties historical, cultural and natural legacy. As a result new state, federal and private partnerships were formed to address issues of mutual interest and to make future land management and planning decisions. (ID-Wright)

In cooperation with Charles M Russell Wildlife Refuge, BLM - Montana State Office, Defenders of Wildlife - Missoula Regional Office, The Nature Conservancy - The Matador Ranch the Unit assessed the ability of Landsat TM satellite imagery for mapping and monitoring prairie dog colonies in north-central Montana. The results of this project will help land management agencies and conservation groups plan and implement more cost effective and consistant surveying techniques, as well as providing the ability to map much larger, and/or otherwise inaccessable areas. (MTW-Ball)

Examined a variety of factors that are influencing habitat selection and parental care tactics and demography of coexisting bird species. Nest predation has an important influence on behavior, habitat selection, and demography. This is affected by habitat changes over time due to weather and browsing. The results are being used by the US Forest Service in their management plans. (MTW-Martin)

Evaluated the influence of nitrogen enrichment on plants and small-mammal communities in grasslands of the south-central Great Plains. Under low-level nitrogen addition, found no real patterns in survival or movement probabilities of small mammals and only subtle changes in vegetation were noted during the first two years. EPA will use this information to (OK-Clark, Hellgren, Leslie, Parsons)

Reviewed and evaluated existing studies from the Ozark National Scenic Riverways and developed a conceptual model to aid in understanding cause-effect relations between environmental stressors and important natural resources. NPS will use the model as inputs to decision support models for monitoring and assessment of the parks aquatic resources. (MO-Rabeni)

Studied the effects of forest land management practices on aquatic resources using benthic invertebrates as indicators of biological conditions. Invertebrate community metrics seemed to be keyed into local-level variables affected by timber management such as substrate size and organic matter; reach-level variables such as stream bank erosion and canopy cover; and watershed-level variables such as road densities and unbuffered stream bank. U.S. Forest Service personnel will incorporate this information in development of land management plans. (MO-Rabeni)

Conducted an ecological evaluation of Maryland's coastal bays to facilitate the development of biological protocol for site selection of spoil disposal areas based on fish, shellfish and other ecologically and environmentally important factors. Based on our preliminary analysis of the data from the 4 years of the study, Maryland's coastal bays have species complexes and water quality conditions typical of high quality Mid-Atlantic estuaries. Management suggestions have been forwarded to the Maryland Department of Natural Resources to minimize impacts spoil placement. (MD-Hughes)

Evaluated habitat restoration projects in northeastern Oregon and detected positive changes in the riparian vegetation and stream channel morphology; however, no changes could be detected in stream temperature and only minor changes in populations in steelhead standing crops. Oregon Department of Fish and Wildlife personnel will use this information for evaluating, designing or reviewing future restoration projects. (OR-Li)

Environmental Contaminants

Examined the effects of 2,3,7,8-TCDD on sexual development of fish. Results, together with other field and laboratory observations provide further evidence that environmental endocrine disrupting chemicals may be adversely affecting reproduction and development of wild fishes. Results also support the use of medaka as a laboratory model. The medaka is a fish that can easily be reared and held in the laboratory, and has been shown to be sensitive to a variety of contaminants. (MO-Noltie, Rabeni)

Mercury is a contaminant associated with gold mining in regions of the West. Fish, amphibians and aquatic invertebrates from 17 historic gold mining sites in northern California were collected and analyzed for mercury. At three sites, top level carnivores (bass and trout) bioaccumulated mercury through their food chains. This information will help resource managers evaluate the potential threats of mercury associated with old gold mines. (CA-Duffy)

Experimentally documented uptake of PCBs in trout fed commercially prepared diets. This work showed that FDA limit of 0.2 ppm PCBs in fish feeds is adequate to ensure that PCB concentrations in trout fillets will not exceed 0.1 ppm, providing there are no other environmental sources of PCBs. (PA-Carline)

Sampled white sturgeon in the Columbia River basin and documented significant levels of numerous anthropogenic chemicals in fish tissues. Also found signs of abnormal reproductive development in some populations. Information will be used by state and federal agencies to better understand reproductive failure in white sturgeon in the Columbia Rver Basin and for establishing state-wide water quality guidelines. (OR-Schreck)

Dioxins are contaminants resulting from various manufacturing processes, including paper pulp production. Rainbow trout were exposed to 2,3,7,8-TCDD, a dioxin isomer. Exposure was linked to changes in visual development in embryonic trout. This finding helps to provide the theoretical framework for evaluating contaminant effects on recruitment of fish populations, and will help state and federal agencies establish chemical screening processes for contaminants. (MO-Carvalho, Rabeni)

Used histopathological analysis of mosquitofish collected at the Sonny Bonno Salton Sea NWR to look for potential contaminant effects at six refuge sites. The degree of liver vacuolization and incidence of liver melanomacrophage aggregates was determined. No differences in variables were noted among sites. The USFWS will use this information for refuge monitoring and planning. (TX-Patino)

Fisheries Management

The common carp is one of the most damaging nonindigenous species to be introduced into Midwestern lakes, and is a species for which few control measures exist. Cooperating faculty members of Unit found that non-specific feeding odor can be used as bait for carp removal. Prostaglandin sex pheromone can also be used as an attractant, but it's successful use in carp removal would require either a very efficient trap or the use of other stimuli to keep attracted fish in the area. (MN-Andersen)

Electrofishing is one of the most common fish collection methods used by aquatic scientists in North America. The An extensive laboratory study about the effects of electrofishing on warmwater game and nongame fish showed little evidence of injury to large-bodied fish, but potentially significant levels of mortality to some small game and nongame species. (MS-Miranda)

Determined the suitability of the McKittrick Creek to support the possible introduction of Rio Grande cutthroat trout. Factors evaluated included genetic analyses, habitat analysis, and potential competition with introduced strains of rainbow trout and longeared sunfish. Results will be used by the Guadalupe Mountains National Park, Texas, to formulate management plans for McKittrick Creek. (CO-Bergersen)

Under a Cargill Fellowship the Minnesota Unit investigated the affects of fish on benthic macroinvertebrates, benthic algae, and leaf litter processing in Valley Creek, Minnesota. Of particular interest was the effect of sculpin on benthic macroinvertebrates, periphyton, and leaf litter processing. (MN-Vondracek)

Methyl testosterone is used to control sex in fish raised in commercial aquaculture. However, it accumulates in pond sediments and may pose a human health risk. We found that tilapia can be masculinized by brief immersion as larvae in triancinalone acetate, suggesting an alternative to methyl testosterone. This finding will be further explored for potential use in the aquaculture industry. (OR-Schreck)

Determined rainbow trout growth and survival in Flaming Gorge Reservoir, Utah. Report will be used by State of Utah to understand and guide fisheries management and stocking stratgies in Flaming Gorge Reservoir and in other state reservoirs. (UT-Budy)

Determined factors affecting trout population dynamics, abundance, and distribution in the Logan River, Utah. Report will be used by the State of Utah to understand and manage native trout fisheries in the Logan River. (UT-Budy)

Examined stocking strategies for Snake River cutthroat trout and Colorado River rainbow trout fingerlings raised at whirling disease negative hatcheries and stocked into the Dolores and Cache la Poudre Rivers to determine fingerling growth and survival in the presence of whirling disease. Snake River cutthroat trout not only grew and survived better than rainbow trout, but had lower spore loads and lower levels of infection within the population making them more appropriate for stocking into infected rivers. If rainbow trout are stocked into infected waters, raising fingerlings to a larger sizes does not appear to improve potential growth rates or survival rates. Stocking rainbow trout in the spring could maximize growth rates but will expose fish to a greater triactinomyxon densities resulting in higher intensity of infection. This study was done for the Colorado Division of Wildlife and the information gained will be used in formulating management actions designed to reduce or eliminate the impacts of whirling disease on the states' trout resources. (CO-Bergersen)

Analyzed statewide information concerning the economic impact and social benefits that state fisheries provide and information concerning the preferences that different types of anglers have for recreation experiences and management actions. This information will be used by the Minnesota Department of Natural Resources to evaluate sport fisheries regulations and other management practices. (MN-Fulton)

Investigated the use of two aquatic pesticides for the control of the oligochaete host of whirling disease, Tubifex tubifex. In laboratory and pond experiments, both TFM and Bayluscide were toxic to the worms, but Bayluscide appeared to be the most feasible for control of the organisms in whirling disease infected hatcheries. The Colorado Division of Wildlife will use the results to investigate the ongoing clean-up of the hatchery system. (CO-Bergersen)

Investigated walleye populations in Tennessee and found most, if not all, populations are incapable of sustaining themselves through natural reproduction. Thus, most walleye fisheries in the state would collapse without annual inputs of hatchery-reared fingerlings. The minimum size limit regulations currently in effect were evaluated via simulation modeling and were judged to be very effective in maximizing yields. Tennessee Wildlife Resources Agency biologists are using this information to expand their stocking programs and justify their management of these fisheries with minimum size limits. (TN-Bettoli)

Examined the possibility that walleye recruitment failure in Tennessee reservoirs was related to nutritional deficiencies in the diet of female walleyes feeding on exotic clupeids. Under experimental conditions, walleye fry experienced good survival rates, but fertilization and hatching rates were very low. Hatching rates were positively related to thiamine concentrations in the eggs. Although clinical signs of Early Mortality Syndrome were observed in some fry, the role that nutritional deficiencies are playing in poor walleye reproduction in the field remains unclear. Based on these results, hatchery personnel are considering prophylactic treatments of thiamine to walleye brood fish to increase hatch rates and enable them to meet annual production quotas. (TN-Bettoli)

Investigated a smallmouth bass fishery in a large unregulated river and determined the seasonality of fishing pressure, size of fish harvested, and movements of smallmouth during the spawning season to assist in making management decisions for this population. (TN-Bettoli)

Found that lingcod captured as bycatch are significantly stressed by the bycatch process and suffer mortality if the epilimnion is warm at time of capture. In addition, small fish were stressed more than larger individuals. NMFS will use this information for evaluating the utility of establishing catch-size regulations and fishing seasons. (OR-Schreck)

Found that acousitc telemetry can be used to assess emigration rates and behavior of outmigrant barged and run of the river steelhead. Mortality of fish moving through the estuary appears related to the tidal cycle when they reach the estuary. US Army Corps of Engineers will is using this info to revise sampling methodologies for enumerating outmigrant smolts. (OR-Schreck)

Completed a study on the bioenergetics of juvenile Atlantic salmon in the Connecticut River. Findings are relevant to numerous state and federal management agencies and provide insight for understanding seasonal and annual variation in individual growth rates. (VT-Ols[illegible], Parrish)

A new salmonid downstream live trap was designed and tested in northern California streams. Results indicated the new design was effective in separating small and large fish and reduced mortality to juvenile salmon. (CA-Duffy)

Working with Texas Parks and Wildlife we determined effects of handling procedures on the stress response of juvenile largemouth bass, and the association of this stress response with predator avoidance success. This information will help the state determine procedures for handling largemouth bass being stocked into Texas lakes. (TX-Patino)

Investigated the balance of food supply and demand for game fish in Spirit Lake, one of Iowa's most important fisheries. Stocked walleye consume roughly 90% of the fish food base in Spirit Lake, and in some years there is notable cannibalism of newly stocked walleye by larger walleye stocked in previous years . We developed simple regression models allowing fishery managers to estimate annual population consumption from readily available population size and mean fish weight data. This information will be used by the State of Iowa to manage the Sprit Lake walleye fishery. (IA-Pierce)

Investigated reproductive behavior of the Neosho madtom under different flow regimes. Flowing water decreased the average frequency, duration, and bout length of nest building behavior as well as reproductive behavior sequences. Successful use of ultrasound, environmental stimulus manipulation, and knowledge of the negative effects of flowing water provide greater understanding of Neosho madtom reproduction. This information will be used by state and federal agencies to better understand and manage this species. (MO-Noltie, Rabeni)

Abundance and biomass of aquatic invertebrates drifting in the upper Sacramento River, California, were sampled quarterly for one year. Natural drift in the river channel was compared with samples obtained with experimental pumps. Results will be used to design better sampling techniques for determining the health of the river. (CA-Duffy)

Examined habitat use by walleye in Lake Champlain. Determined that juvenile walleye resided mostly in the Lamoille River rather than Malletts Bay as had been presumed. This finding will be used by the Vermont Fish and Wildlife Agency in furthering its walleye sport fishery goals. (VT-Parrish)

Determined the optimal conditions for swimbladder inflation in striped bass larvae reared in intensive aquaculture systems and found that levels of aqueous calcium above 250 ppm and certain surfactants aid swim bladder inflation in larval striped bass. This research will be of direct aid to hatchery personnel at the USDA's Northeastern Regional Aquaculture Center who are attempting to rear striped bass and may also be applicable to other small egged fishes. (MD-Hughes)

Conducted multi-year surveys of recreational fishing pressure on two regulated rivers in middle Tennessee. Fishing pressure on the the Duck River trout fishery was initially very low and fishing pressure on the Elk River was noted to be steadily declining from 1988 through 2000. The Tennessee Wildlife Resources Agency (TWRA) used the information to promote and successfully increase fishing pressure on the Duck River fishery and will use the information obtained from the Elk River to justify reducing trout stocking rates. (TN-Bettoli)

Surveyed streams in the King Range National Recreation Area. Steelhead trout were documented in all streams and summer survival rates were calculated for two of the streams. Bureau of Land Management personnel will use this information when developing plans for the recreation area. (CA-Duffy)

In support of Federal Aid in Sportfish Restoration, we determined that hybrid bluegills are excellent candidates for urban fishing environments. However, due to high catch rates, they must be intensively managed. (OK-Winkelman)

Game Management

Tested the morning covey call count technique to estimate fall northern bobwhite density. Covey calling rates were most influenced by area and wind speed (increased wind speed decreased calling) and observer accuracy. The study pointed out concerns about this commonly used technique. The State of Missouri will use these results in deciding on management options based on bobwhite density estimates obtained through the call count technique. (MO-Drobney, Seiler)

Analyzed waterfowl band returns for redhead ducks to determine migration routes and areas of the country where mortality occurs. This information will be used by the FWS and other agencies involved in conservation and management of waterfowl populations in North America. (SD-Higgins, Berry)

Students from the Montana Cooperative Wildlife Research Unit banded ducks at a remote site near Cumberland House, Saskatchewan. Data on recoveries of these banded ducks provides the USFWS and CWS critical information on annual survival rates, harvest rates, migratory pathways, and geographic distribution of harvest. (MTW-Ball)

Completed a 4-year research project on landscape analysis and variability in mourning dove abundance along call-count routes in Mississippi and Alabama. Changes in agricultural and forest land area over the study period were documented and relative abundance of doves was positively correlated with agriculture land area but negatively correlated with forestland area. Mississippi Department of Wildlife, Fisheries, and Parks will use this information to improve their call-count surveys. (MS-Vilella)

Determined the population size of a desert bighorn sheep population in an isolated mountain range in central New Mexico, and assessed the habitat of this population. The habitat assessment will be used by the BLM and the state of New Mexico to establish habitat managment actions for this sheep population. (NM-Arana, Thompson)

Habitat Management and Restoration

Examined the relationship between water levels and accessible habitat, and how accessible habitat influenced Dunlin and Semipalmated Sandpiper numbers in managed wetlands at Pea Island (North Carolina) and Merritt Island (Florida) National Wildlife Refuges. The information will be used by the USFWS for managing water regimes for optimal use by shorebirds. (NC-Collazo)

A model is being built to predict the effects of and prioritize habitat restoration for endangered chinnok streams in the Columbia Basin. This model will be used to establish management plans for salmon recovery in the basin. (UT-Budy)

Investigated prescribed buring to reduce cattails and enhance waterbird use at Sequoyah National Wildlife Refuge in east-central Oklahoma. After cattail reductions, waterbird use and aquatic invertebrates increased, and general water quality improved. Despite these improvements, regular treatment of cattail stands with fire will be needed to keep its density low. The refuge will use this information in refuge management plans. (OK-Leslie)

Evaluated breeding bird population densities and community structure in relation to cattle grazing intensity as a function of distance from water developments. This information will help state and federal agencies develop grazing and water management plans in the West. (CO-Anderson, Leuders)

Stream alkalinities were important in determining brook trout spawning success. The majority of spawning activity occurred where stream alkalinities were highest. This information will be used by the USFWS and other agencies in planning for restoration of this species into native habitats. (WV-Mazik)

We compared abundance and size of juvenile coho salmon migrating from a artificial side channel with the same from natural stream habitats. Number of fish in natural habitats varied with dissolved oxygen concentration, but two of three had greater abundance than the artificial habitats. Density of juvenile coho salmon in the artificial habitat was low, but fish were larger relative to those in natural habitats. This information is being used by state and federal managers to protect and restore coho salmon habitats. (CA-Duffy)

Detailed seasonal fish movement and habitat use patterns for fishes in the lower Flint Ricer Basin, GA. The results from this study will be used by the USFWS in evaluating the potential effects of reservoir construction in the Basin. (GA-Peterson)

Evaluated habitat associations of fish populations with habitat-modified piers and natural woody debris in piedmont Carolina reservoirs. Results will be used by state and federal agencies to guide reservoir shoreline management. (NC-Kwak)

American Chestnut trees infected with the Chestnut blight were treated with a hypovirus inoculum as a means to induce a remission of the disease and increase survival. Trees treated with the hypovirus inoculum survived longer than non-treated trees. This information is being used by federal and state agencies to help regulated the Chestnut blight and its spread. (WV-Mazik)

Assessed the restoration of a major wetland complex in southwestern Oklahoma, which had been drained about 90 years ago. Germination experiments showed that despite lack of wetland hydrology for decades, the soil contained seeds of desireable wetland species, many of which germinated when fluvial processes returned to the wetland. Use of the wetland by waterbirds increased during initial restoration activities. Initial results were used by the state of Oklahoma for evaluating the feasiblity of restoring the area. These results potentially have extremely broad implications for restoration of previously drained wetlands. (OK-Leslie, Miller)

Evaluated the impacts of island restoration on the breeding biology of nesting ardeids, including cattle egrets, at Salt Plains National Wildlife Refuge in north-central Oklahoma. Eight species of egrets and herons nested near restoration activities, which included heavy and noisy equipment. There was no discernable decrease in the productivity of the rookery and an estimated 24,469-31,854 breeding pairs of ardeids nested on the island. (OK-Feirer, Leslie)

Evaluated options for restoring portions of the US Army Corps of Engineers Bayou Meto Basin Improvement Project Plan area. A combination of field work, analyses of existing data and published accounts, mapping, and modeling habitat relationships documented alterations that have occurred since presettlement times and provided possible restoration approaches to remedy lost or missing ecological attributes. The information and recommendations are being used by the U.S. Army Corps of Engineers in developing the project plans for the area. (MO-Fredrickson, Rabeni)

Completed research in aid of Scrub Jay habitat restoration efforts. Research elucidated the historical pattern of land use and identified the 1940's aerial photography as perhaps the best known reference point for restoration. Results were presented to personnel from numerous agencies at the Indian River Lagoon Symposium in August 2002. (FL-Carthy)

Developed a series of training aids, including publications and interactive material, for use by National Park Service interpreters in the Pacific northwest to explain to visitors the threats posed by noxious weeds in their parks. These materials increased visitor awareness that nonnative plants may cause serious problems in maintaining biodiversity. Materials also contained information on the methods that could be used by park personnel to controll noxious weeds and restore native plant communities. (ID-Wright)

Brook trout restoration is an important issue in many eastern states. Aquatic macroinvertebrates are important components of brook trout diets. We studied macroinvertebrate om Shavers Fork River, WV, and found that acidity limited macroinvertebrate numbers. This information will help managers determine areas where restoration efforts might best succeed. (WV-Mazik)

Determined the value of different vegetation charactersitics to fish at the state Marsh Island Wildlife Refuge. Some submerged aquatic vegetation stands were associated with higher nekton densities and diversities. Water control structures can be used to manipulate ponds for favorable vegetation characteristics. Findings can be used to focus pond management strategies on the most beneficial submerged aquatic vegetation types. (LA-La Peyre)

Imperiled Species

Investigated habitat suitability of selected forested lands for avian communities in Puerto Rico, and their implications for the recovery of Puerto Rican Parrots. In this study, we examined avian fruit preferences and their seed-removal services at five study sites in north-central Puerto Rico. The study will be used by the FWS in restoration efforts for the Puerto Rican Parrot. (NC-Collazo)

Cooperating faculty examined the viability of alternative egg removal strategies as a first step in developing a proactive captive rearing effort to enhance the Great Lakes population of piping plovers. Several strategies appear to have the potential to significantly augment the population. These are: four egg (full clutch) removals from 25% or 37.5% of pairs over 2 and 4 years. The USFWS will use this information in the development of recover plans for the Great Lakes population. (MN-Andersen)

Cooperating faculty surveyed shoreline and islands in the U.S. Great Lakes, their connecting waters and in lakes Winnebago (WI), Champlain (NY, VT) and Oneida (NY) to obtain estimates of breeding pairs of colonial waterbirds (1997-1999). Compared population estimates to those obtained during previous census efforts in the 1970s and 1980s. This work, supported by the USFWS, will be used by state and federal managment agencies to monitor species population trends in the Great Lakes region. (MN-Andersen)

Cooperating faculty assessed historic piping plover nesting sites for suitablity in recovery efforts for this species. The information will be used by the USFWS and other management agencies working to restore this species. (MN-Andersen)

Highway culverts (circular, corregated) in high priority Topeka shiner habitat in South Dakota were surveyed for environmental compatability. Aquatic gap analysis data were used to predict high priority habitat. Few fish passage problems were found. Results are being used by the USFWS and state agencies for the protection and management of this endangered species. (SD-Berry)

Assessed spawning success of walleye in Luxapallila Creek,MS a historic spawning site for this unique strain of walleye. Results suggest that walleye spawning in Luxapallila Creek is limited and intermittent. These results will be use by the Corps of Engineers to efforts to restore this population. (MS-Miranda, Schramm)

Examined critical aspects of the life history of two endangered invertebrate species endemic to middle Tennessee. The information was provided to the U.S. Fish and Wildlife Service, and will be used in recovery efforts. (TN-Layzer)

Conducted a habitat assessment for the endangered Cape Fear shiner that included measurements of water quality, contaminants, and physical instream habitat. Results will be used by state and federal agencies to guide management of this endangered minnow and the rivers and watersheds where it occurs. (NC-Kwak)

Standard weights are used commonly by fish managers to assess condition of sport fish populations; however, few have been developed for non-game species. We developed standard weight equations for four imperiled Colorado River Basin fishes: razorback sucker, flannelmouth sucker, humpback chub and roundtail chub. These equations will be used by State, Federal and Local fisheries biologists to monitor the health and condition of various populations of these fishes. (AZ-Bonar)

Evaluated the role of flooding in maintaining native fish populations in southwestern streams. Flooding in non-impounded streams promoted native fishes by displacing nonnatives, but was deleterious in impounded streams due to flushing of nonnative fishes over the spillways. This information will be used by State, Federal, and Local management agencies when designing dams and spillways for sportfish impoundments upstream of sensitive native fish populations. (AZ-Bonar)

Examined spawning and recruitment of razorback sucker in Rock Tank Pond in Arizona and found that suitable gravel substrate, lack of introduced fishes, water depth and water quality were important factors contributing to successful reproduction. This information is being used by USFWS biologists to manage small ponds where reproduction of razorback sucker is desired. (AZ-Bonar)

Produced a video depicting spawning behavior between two species of Hybognathus. The video and report describe the potential for hybridization of the two species. This information will be used by the U.S. Fish and Wildlife Service to relocate the endangered species (H. amarus) to areas within its historical range. (NM-Caldwell)

Determined optimal feeding conditions for maintaining several species of captive freshwater mussels. This information will be used by the U.S. Fish and Wildlife Service to help establish captive propogation programs designed to to assist in the mussel restoration efforts. (VA-Neves)

Evaluated the suitability of the Cedar Bluff site for recovery of freshwater mussels. This information will be used by the U.S. Fish and Wildlife Service in recovery plans for imperilled mussel species. (VA-Neves)

Investigated mechanisms of brood reduction in an endangered red-cockaded woodpecker population in South Carolina. New technology involving video cameras and daily monitoring of nest cavities allowed new insight into theories of brood loss and asynchronous hatching, and generated new estimates of life history parameters that reveal some potential biases in previously accepted values. This info will be used by USFWS to better refine population models of red-cockaded woodpeckers throughout the southeast. (SC-Otis)

Created models linking the endangered Topeka shiner to 8 habitat features and then produced maps showing the known and predicted distribution of this species. GAP analysis was then applied to the locational data and is being used by state a federal agencies to identify priority areas for conserving this species. (SD-Berry)

Non-game Species

Evaluated the timing of migration of songbirds through a major concentration area in the Great Lakes Basin. The study provides information on rates of weight gain by individuals in different habitat types, and the effect of conspecific density on stopover duration. Information on the landuse pattern surrounding migratory bird concentration areas is provided and compared to non-concentration areas. This study, sponsored by the EPA, will be used to improve habitat conditions for birds as they migrate to and from wintering and breeding areas. (VT-Bonter, Donovan)

Studied the metapopulation dynamics and genetics of black bears in Big Bend National Park on the Rio Grande in south Texas. Radiotelemetry verified that bears depend on mast production and regularly move from Big Bend into Mexico, perhaps when food availability is low in the Park. Genetic analyses confirmed that bears in Big Bend are differentiated from other populations in the Texas-Mexico metapopulation. NPS personnel will use this information when developing management objectives and plans for Big Bend. (OK-Hellgren, Leslie)

Completed an evaluation of amphibian monitoring techniques and an investigation of environmental stressors and their impacts on amphibian populations. This research expanded and complimented previous salamander research in Great Smoky Mountains National Park as well as on-going studies in Shenandoah National Park and Patuxent Wildlife Research Center . This work will contribute to the long-term natural resource monitoring program goals of the NPS. (NC-Simons)

Camp Pendleton Marine Corps Base supported 386 snowy plover nests during 1994-1999. Nesting was usually initiated the first week in April and hatching generally extended to early July. Hatch rate during the 5 year period was 57%, with predation, unknown causes, flooding and abandonment the primary sources of nest failure. This study documents the importance of Camp Pendleton to the conservation of this threatened species. (CA-Duffy)

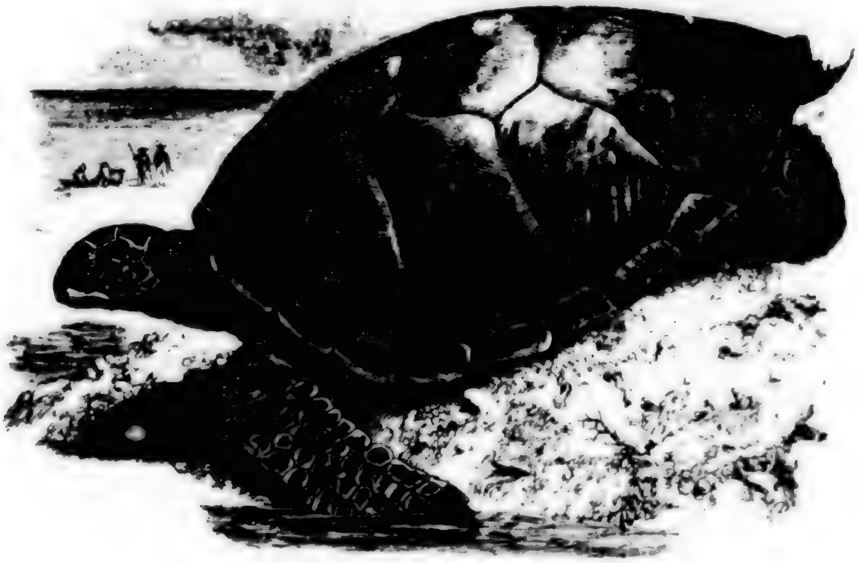
Miscellaneous

Determined that rainbow trout grown in high levels of free carbon dioxide (30 to 50 mg/L) had significantly reduced growth. Acceptable levels to be used by fish farms in Appalachia are less than 10 mg/L carbon dioxide. (WV-Mazik)

Assessed the effect that wolves in Yellowstone National Park are having on coyote populations in the park. It is clear that coyotes pack size, as well as time budget activities have changed since the introduction of wolves in 1995. Coyote pack size has decreased, and they spend more time being vigilant. Park biologists will use this information to better understand the dymanics of coyote-wolf populations in the park. (UT-Bissonette)

Assisted the National Park Service's Natural Landmarks Office in the conduct of cultural and ecological evaluations of new proposed landmarks, and surveyed the ecological condition of existing landmarks. Information has been used routinely by the National Park Service's Natural Landmarks Office to make more informed decisions regarding the acquisition of new landmarks. (ID-Wright)

Developed a Bird-Avoidance Model for NAF El Centro. The model accessed the risk of a damaging bird strike at the airfield and the target ranges. Furhthermore, the probability of a hazardous bird strike was examined over time and space. The model was put in CD-Rom format accessible to flight schedulers, flight crews, control-tower personnel, range controllers, safety officers and natural resource managers. (UT-Bissonette)



Picture courtesy of Courtney Conway (AZCoop Unit)

UNIVERSITY SERVICE

Courses Taught

- Administration in Natural Resources (Percival; 3 hrs./12 students; 2002/01/01 to 2002/05/01)
- Advanced Fish Physiology, FISH 511 (Congleton; 2 hrs./10 students; 2002/08/26 to 2002/12/20)
- Advanced Fish Ecology, FISH 514 (Congleton; 2 hrs./15 students; 2001/08/26 to 2001/12/20)
- Advanced Fisheries Management (Hubert; 1 hrs./10 students; 2002/01/14 to 2002/05/16)
- Advanced Fisheries Management (Bonar; 3 hrs./10 students; 2002/01/10 to 2002/05/08)
- Advanced Ichthyology (Welsh; 4 hrs./8 students; 2001/08/02 to 2001/12/15)
- Advanced Ichthyology (Welsh; 4 hrs./5 students; 2002/08/20 to 2002/12/15)
- Advanced Limnology (Chipps; 3 hrs./15 students; 2002/01/19 to 2002/05/15)
- Advanced Nongame Ecology and Management (Boal; 3 hrs./5 students; 2001/08/10 to 2001/12/15)
- Advanced Topics in Avian Ecology (Roby; 1 hrs./10 students; 2002/01/01 to 2002/03/31)
- Advanced Wetlands Ecology (Kitchens; 4 hrs./4 students; 2002/05/01 to 2002/07/01)
- Advanced Wildlife Management-Mammals (Bender; 4 hrs./25 students; 2001/08/13 to 2001/12/15)
- Analysis of Populatons (Andersen; 3 hrs./25 students; 2002/01/20 to 2002/05/10)
- Applications of GIS and Remote Sensing Techniques in Natural Resources (Loftin; 3 hrs./33 students; 2001/09/03 to 2001/12/19)
- Applied Multivariate Statistics in Fish and Wildlife Research (Bozek; 3 hrs./8 students; 2001/09/03 to 2001/12/14)
- Applied Population Dynamics (Conroy; 4 hrs./30 students; 2002/01/04 to 2002/05/10)
- Aquaculture (Parker; 3 hrs./9 students; 2001/08/20 to 2001/12/15)
- Aquatic Ecology Seminar, BIOL 500 (Zale; 1 hrs./6 students; 2002/02/20 to 2002/05/01)
- Aquatic Toxicology (Mazik; 4 hrs./5 students; 2001/08/20 to 2001/12/15)
- Behavioral Ecology, WILD 7005 (Afton; 3 hrs./7 students; 2002/08/26 to 2002/12/14)
- Big River Management (Budy; 3 hrs./15 students; 2002/01/07 to 2002/05/24)
- Bioenergetics Modeling, Fish 507 (Beauchamp; 4 hrs./10 students; 2002/01/07 to 2002/03/20)
- Biological Aspects of Global Change (McGuire; 3 hrs./3 students; 2002/01/17 to 2002/05/11)
- Biological Writing (Ball; 2 hrs./4 students; 2002/01/20 to 2002/05/15)
- Biology of Marine Birds (Roby; 1 hrs./9 students; 2002/04/01 to 2002/06/30)
- Biology of Marine Mammals (Wiley; 2 hrs./2 students; 2002/09/02 to 2002/12/15)
- Classic Literature in Fisheries and Aquatic Sciences, Fish 522 (Beauchamp; 2 hrs./24 students; 2001/10/01 to 2001/12/14)
- Communicating Wildlife Resource Conservation in Society (Thompson; 3 hrs./7 students; 2002/01/15 to 2002/05/15)
- Community Ecology Seminar (Sievert; 1 hrs./20 students; 2002/09/01 to 2002/12/31)
- Complex Adaptive Systems in Nature and Society (Develop and Taught) (Bain; 2 hrs./20 students; 2002/01/24 to 2002/05/04)
- Conceptual Foundations in Ecology (Conway; 3 hrs./12 students; 2001/08/24 to 2001/12/18)
- Conservation Biology (Budy; 2 hrs./8 students; 2002/09/03 to 2002/10/08)
- Conservation Biology of Wildlife, FW 561(Roby; 13 hrs./18 students; 2001/09/01 to 2001/12/31)
- Contemporary Issues in Fisheries Science (Margraf; 1 hrs./8 students; 2002/01/17 to 2002/05/15)
- Coral and Coral Reefs (Zoology 410)(Birkeland; 3 hrs./25 students; 2002/01/15 to 2002/05/11)

- Critical Thinking in Wildlife Ecology and Conservation (Carthy; 1 hrs./3 students; 2002/08/26 to 2002/12/16)
- Current Issues in Fisheries (Hughes; 1 hrs./5 students; 2002/09/03 to 2002/12/23)
- Design and Analysis of Ecological Research (Edwards; 4 hrs./32 students; 2001/08/27 to 2001/12/07)
- Design and Analysis of Ecological Research (Edwards; 4 hrs./38 students; 2002/08/26 to 2002/12/13)
- Design and Analysis of Vertebrate Population Studies (Thompson; 3 hrs./12 students; 2001/08/27 to 2001/12/19)
- Diadromous Fish (Mather; 3 hrs./12 students; 2002/09/07 to 2002/12/14)
- Ecological Interactions of Fishes (Mather; 3 hrs./12 students; 2002/01/01 to 2002/05/15)
- Ecological Research Design (Thompson; 3 hrs./8 students; 2002/08/26 to 2002/12/18)
- Ecology of Fishes (Parrish; 3 hrs./5 students; 2002/08/27 to 2002/12/10)
- Ecology of Running Waters (Wilzbach; 3 hrs./12 students; 2002/08/26 to 2002/12/23)
- Ecology of Aquatic Invertebrates (Chipps; 3 hrs./10 students; 2002/09/09 to 2002/12/19)
- Economics of Coral Reefs, Biology 691 (Birkeland; 1 hrs./25 students; 2001/08/25 to 2001/12/21)
- Ecotoxicology: Emphasis on Fish and Wildlife (Snyder; 2 hrs./5 students; 2002/01/07 to 2002/04/30)
- Endangered Species Management (Neves; 3 hrs./18 students; 2002/08/27 to 2002/12/10)
- Endangered Species Management (Powell; 3 hrs./8 students; 2002/01/05 to 2002/05/10)
- Environmental Biology of Fishes (Caldwell; 4 hrs./7 students; 2002/01/08 to 2002/05/14)
- Estimation of Fish & Wildlife Population Parameters (Diefenbach; 3 hrs./4 students; 2002/09/01 to 2002/12/10)
- Estimation of Fish and Wildlife Population Parameters (Diefenbach; 4 hrs./4 students; 2001/08/21 to 2001/12/07)
- Estimation of Parameters of Fish and Wildlife Populations (Conroy; 4 hrs./9 students; 2002/08/16 to 2002/12/11)
- Estimation of Parameters of Fish and Wildlife Populations (Conroy; 4 hrs./6 students; 2001/08/24 to 2001/12/10)
- Evolutionary Ecology, BIOL 825 (Cully; 3 hrs./students; 2002/08/26 to 2002/12/20)
- Fire Ecology (Higgins; 3 hrs./27 students; 2002/09/04 to 2002/12/15)
- Fish & Wildlife Seminar (Krementz; 1 hrs./12 students; 2001/08/20 to 2001/12/15)
- Fish & Wildlife Seminar (Krementz; 1 hrs./5 students; 2002/01/15 to 2002/05/20)
- Fish Bioenergetics (Duffy; 3 hrs./8 students; 2002/01/24 to 2002/05/12)
- Fish Ecology (Budy; 2 hrs./10 students; 2002/01/07 to 2002/02/27)
- Fish Ecology (Isely; 3 hrs./10 students; 2002/08/15 to 2002/12/15)
- Fish Ecology (Li; 4 hrs./28 students; 2002/01/03 to 2002/06/10)
- Fish Ecology (Pierce; 3 hrs./5 students; 2002/06/23 to 2002/07/19)
- Fish Ecology (Magoulick; 3 hrs./7 students; 2001/08/28 to 2001/12/17)
- Fish Ecology, FW 426 (Galat; 3 hrs./6 students; 2002/01/20 to 2002/05/15)
- Fish Habitat, Analysis, Design, and Modelling (Bozek; 3 hrs./students; 2002/09/03 to 2002/12/14)
- Fish Habitats and Restoration, FW8465 (Vondracek; 3 hrs./8 students; 2001/09/04 to 2001/12/22)
- Fish Management (Isely; 3 hrs./8 students; 2001/08/23 to 2001/12/15)
- Fish Physiology (Hughes; 3 hrs./6 students; 2002/09/04 to 2002/12/23)
- Fish Physiology (Hughes; 3 hrs./5 students; 2001/09/01 to 2001/12/19)
- Fish Physiology (Mazik; 3 hrs./10 students; 2002/08/19 to 2002/12/15)
- Fish Population Dynamics (Carline; 3 hrs./11 students; 2002/01/07 to 2002/05/03)

- Fish and Wildlife Biometrics (Bettoli; 3 hrs./12 students; 2001/08/20 to 2001/12/14)
- Fish and Wildlife Biometrics (Bettoli; 3 hrs./20 students; 2002/08/20 to 2002/12/13)
- Fish and Wildlife Graduate Seminar (Moffitt; 1 hrs./17 students; 2002/08/26 to 2002/12/13)
- Fish and Wildlife Seminar (Thompson; 1 hrs./5 students; 2002/01/12 to 2002/05/09)
- Fish and Wildlife Toxicology Laboratory, FISH 497 (Grue; 2 hrs./7 students; 2002/01/02 to 2002/05/03)
- Fisheries Management (Schramm; 3 hrs./9 students; 2001/08/20 to 2001/12/07)
- Fisheries Management (Schramm; 3 hrs./5 students; 2002/08/19 to 2002/12/08)
- Fisheries Science (Parrish; 3 hrs./8 students; 2002/01/14 to 2002/05/16)
- Fisheries and Wildlife Inventory and Management (Kwak; 5 hrs./17 students; 2002/05/20 to 2002/06/21)
- Foraging Ecology (Griffith; 2 hrs./students; 2002/01/15 to 2002/05/31)
- Freshwater Biomonitoring (Angermeier; 4 hrs./16 students; 2002/08/26 to 2003/05/10)
- Graduate Seminar. Wildlife Biology (Ball; 1 hrs./24 students; 2002/01/20 to 2002/05/15)
- Graduate Seminar, FW 5004 (Vaughan; 1 hrs./15 students; 2002/01/14 to 2002/05/05)
- Graduate Seminar, FW 507 (Anthony; 1 hrs./20 students; 2002/01/01 to 2002/04/30)
- Graduate Student Orientation FW 599(Li; 1 hrs./20 students; 2001/09/01 to 2001/12/31)
- Human Dimensions of Biological Conservation (Fulton; 3 hrs./25 students; 2002/01/20 to 2002/05/10)
- Hunter Check Stations (Ball; 1 hrs./25 students; 2000/10/01 to 2001/12/17)
- Hunter Check Stations (Ball; 1 hrs./22 students; 2001/09/10 to 2001/12/15)
- Introduction to SAS (Wood; 1 hrs./6 students; 2002/01/06 to 2002/05/01)
- Introduction to Wildlife Toxicology, FISH 455/ESC 457 (Grue; 3 hrs./16 students; 2002/01/02 to 2002/05/03)
- Landscape Ecology (Allen; 3 hrs./18 students; 2002/01/10 to 2002/05/01)
- Malacology (Layzer; 3 hrs./5 students; 2001/08/20 to 2001/12/14)
- Mammalogy (Wiley; 3 hrs./15 students; 2002/09/03 to 2002/12/05)
- Marine Mammalogy, FISH 475. Co-principal instructor with Paul R. Wade (VanBlaricom; 5 hrs./32 students; 2002/04/01 to 2002/06/14)
- Marine Mammalogy, NATRS 417 (VanBlaricom; 2 hrs./15 students; 2002/03/18 to 2002/03/22)
- Metapopulations and Other Advanced Topics (Ribic; 3 hrs./4 students; 2001/09/03 to 2001/12/22)
- Minimizing Human and Wildlife Conflicts (Gipson; 3 hrs./4 students; 2002/01/17 to 2002/05/17)
- Paleolimnology Field Course (Bozek; 3 hrs./20 students; 2002/06/18 to 2002/07/07)
- Philosophy of Science for Ecology, EY592 (Burnham; 1 hrs./15 students; 2002/08/28 to 2002/12/11)
- Physiological Ecology of Aquatic Organisms (Patino; 3 hrs./8 students; 2002/01/15 to 2002/05/15)
- Population Dynamics and Modeling (Donovan; 4 hrs./11 students; 2002/01/15 to 2002/05/15)
- Population Ecology (Winkelman; 3 hrs./24 students; 2002/08/15 to 2002/12/15)
- Principles of Probability Sampling with Emphasis on Applications to Natural Resources and Ecology. FW696 (Burnham; 1 hrs./19 students; 2001/10/15 to 2001/12/14)
- Principles of Study Design for Fish and Wildlife, FW551 (Burnham; 3 hrs./15 students; 2002/08/27 to 2002/12/10)
- Quantitative Approaches to Conservation Biology (Peterson; 4 hrs./5 students; 2001/08/22 to 2001/12/05)
- Quantitative Approaches to Conservation Biology (Peterson; 3 hrs./12 students; 2002/08/20 to 2002/12/06)
- Quantitative Fisheries Management (Hightower; 3 hrs./24 students; 2002/08/19 to 2002/12/13)
- Quantitative Fisheries Science (Margraf; 3 hrs./8 students; 2002/01/17 to 2002/05/15)
- Regional Systems Dynamics and Modeling (McGuire; 4 hrs./20 students; 2002/09/05 to 2002/12/19)
- Research Concepts (DeStefano; 3 hrs./11 students; 2002/09/03 to 2002/12/13)
- Research Design (Bounds; 1 hrs./11 students; 2002/01/28 to 2002/05/15)

- Research Designs In Ecology (Otis; 1 hrs./6 students; 2002/08/20 to 2002/12/10)
- Research Methods (Duffy; 3 hrs./2 students; 2002/08/26 to 2002/12/23)
- Restoration Ecology (Koford; 3 hrs./10 students; 2002/08/26 to 2002/12/12)
- Restoration Ecology (Koford; 3 hrs./14 students; 2001/08/24 to 2001/12/12)
- River Ecology and Management (Berry; 3 hrs./13 students; 2001/09/01 to 2002/12/31)
- SAS for Biologists (Peterson; 1 hrs./10 students; 2001/09/04 to 2001/12/08)
- SAS for Biologists (Peterson; 1 hrs./12 students; 2002/08/20 to 2002/12/06)
- Sampling and Analysis of Vertebrate Populations (Anderson; 5 hrs./24 students; 2002/01/14 to 2002/05/15)
- Scientific Communication for Natural Resource Professionals (Jennings; 3 hrs./8 students; 2001/08/16 to 2001/12/11)
- Seminar in Aquatic Ecology (Hightower; 1 hrs./9 students; 2002/08/19 to 2002/12/13)
- Seminar in Aquatic Ecology (Kwak; 1 hrs./9 students; 2002/08/19 to 2002/12/13)
- Social Policy and Natural Resource Conflict (Mather; 3 hrs./22 students; 2002/09/01 to 2002/12/15)
- Spatial Ecology of Animals (Mitchell; 3 hrs./6 students; 2001/08/20 to 2001/12/15)
- Special Probelms: GIS (Loftin; 1 hrs./3 students; 2002/01/06 to 2002/05/16)
- Special Problem; Analysis of Live/Dead Recapture/Recovery Data (Grand; 3 hrs./1 students; 2002/08/20 to 2002/12/05)
- Special Topics in Wildlife Ecology and Conservation (Carthy; 3 hrs./10 students; 2001/08/27 to 2001/12/17)
- Stream Ecology (Pierce; 3 hrs./14 students; 2002/01/11 to 2002/05/08)
- Stream Ecology (Rabeni; 3 hrs./20 students; 2002/08/27 to 2002/12/20)
- Suburban Wildlife Ecology (DeStefano; 2 hrs./3 students; 2001/09/09 to 2001/12/14)
- Upland Game Management (Higgins; 3 hrs./14 students; 2002/09/04 to 2002/12/15)
- Waterbird and Wetland Ecology (Loftin; 3 hrs./5 students; 2002/09/03 to 2002/12/14)
- Wildlife Nutritional Ecology (Drobney; 3 hrs./10 students; 2002/01/22 to 2002/05/18)
- Wildlife Population Analysis (Grand; 3 hrs./6 students; 2001/08/20 to 2001/12/15)
- Wildlife Population Analysis, FW 661(Anthony; hrs./16 students; 2001/09/24 to 2001/12/30)
- Wildlife and Fisheries Graduate Seminar (Wood; 1 hrs./34 students; 2002/01/06 to 2002/05/01)

A "hands on" River Ecology course in South Dakota
photo courtesy of Charles Berry (SD Coop Unit)

University Committees and Work Groups

Chair/Director Positions

- Big Beef Creek Research Committee, School of Aquatic and Fisheries Sciences, University of Washington (Beauchamp)
- Committee for Graduate Degree between NCTC and WVU (Mazik)
- Departmental Computer Committee (Hightower)
- Departmental Computer Committee, Zoology (Simons)
- Diversity Enhancement Committee (Carthy)
- Errington Lecture Committee (Koford)
- Executive Committee, Graduate Faculty Senate (Drobney)
- Faculty Search Committee (Margraf)
- Fisheries/Aquatic Ecology Subdiscipline Group (Irwin)
- Graduate Admissions Committee, Zoology Department, University of Hawaii, 2002 (Parrish)
- Graduate Committee (Li)
- Graduate Curriculum Committee (Caldwell)
- Graduate Faculty Senate, President (Drobney)
- Graduate Instruction Committee, Zoology Department, 2001 (Birkeland)
- Graduate Program Committee, School of Natural Resources (Drobney)
- Graduate Program Review in Fisheries (Wilzbach)
- Graduate Research Committee (Winkelman)
- Graduate Seminar Committee (Vaughan)
- Graduate Studies, Department of Fisheries and Wildlife Sciences, School of Natural Resources, Director (Drobney)
- Graduate Studies, Wildlife Conservation Graduate Program, Director (Andersen)
- Hatchery Committee, School of Aquatic and Fishery Sciences, University of Washington, 2001-2002. (Grue)
- Hoyt Teaching Assistant Committee (Wood)
- Landscape Ecology Faculty Search Committee (Pierce)
- Oklahoma Academy of Science, Fish and Wildlife Section (Winkelman)
- Personnel Committee (Fisher)
- PhD Program Assessment Committee (Isely)
- School of Forest Resources Awards Committee (Carline)
- Subcommittee on Graduate Admissions Procedures in the Department of Biology and Wildlife (2002-2003) (McGuire)

Committee and Workgroup Memberships

- Admissions Committee (Collazo)
- Admissions Committee, Inter-Campus Graduate School in Marine Science Admissions Committee (Mather)
- Aquaculture Advisory Committee, USM Agricultural Experiment Station (Hughes)
- Arboretum Committee, UW (Ribic)
- Arboretum Research Subcommittee, UW (Ribic)
- Assessment Partnership (MoRAP) (Galat)

- Awards Committee (Carline)
- Awards Committee, Dept. Animal Ecology (Koford)
- Biennial Report Committee, PSU-School of Forest Resources (Diefenbach)
- Blackjack Ponds Committee, Wildlife and Fisheries Department (Miranda)
- Building Use Committee - Experimental Science Building (Parker)
- CALS Biometry Committee (Ribic)
- Campus Fee Waiver Policy Advisory Committee (Drobney)
- Center for Fish Disease Advisory Committee (Schreck)
- Clark Commemoration Committee (Galat)
- Clinical Veterinary Services Manager Search Committee (Drobney)
- Collections Committee/Biological Sciences (Irwin)
- College GIS/remote Sensing Committee (Loftin)
- Committee for Evaluation of Peer Teaching (Roby)
- Committee on Research, Scholarship, and Graduate Education, University of Vermont (Donovan)
- Committee on Unit Criteria for Promotion and Tenure in the Department of Biology and Wildlife (McGuire)
- Computer Committee (Magoulick)
- Computer Committee-Department of Wildlife Ecology (Ribic)
- Computer Resources Committee, School of Forest Resources (Carline)
- Computer Technology Committee (Fisher)
- Computing Committee (Mitchell)
- Conservation Biology Program (Drobney)
- Conservation Biology Program (Rabeni)
- Coordinator and Moderator, Fifth Annual UW Undergraduate Research Symposium, Universityof Washington, Seattle (Grue)
- Curriculum Committee/Dept Fisheries and Applied Aquacultures (Irwin)
- Department Faculty Teaching Assemblies Leader (Anderson)
- Department of Biology Advisory Committee (Parker)
- Department Representative and Chair-in-Training, Institutional Animal Use and Care Committee (Loftin)
- Department Representative, Graduate Board Committee (Loftin)
- Departmental Doctoral Diagnostic Committee (Vilella)
- Department of Wildlife Ecology & Conservation Faculty Advisory Committee (Percival)
- Department Strategic Planning Committee (Pierce)
- Diagnostic Exam Committee, Zoology Department, 2001 (Birkeland)
- Ecology Group, Auburn University (Irwin)
- Education and Policy Committee, Department Representative. (Budy)
- EECB Curriculum Committee (Birkeland)
- Endowed Chair selection committee (La Peyre)
- Executive Committee for Bonanza Long-Term Ecological Research Program (McGuire)
- Executive Committee for the Regional Resilience and Adaptation Interdisciplinary Graduate Program, University of Alaska Fairbanks. (McGuire)
- Executive Committee, Graduate Faculty Senate (Drobney)
- Executive Council, School of Aquatic and Fishery Sciences, University of Washington, 2001-2002 (Grue)
- FAA Extension and Outreach Committee (Irwin)
- Facilities Committee (Krementz)
- Faculty Advisor, Clemson Student Subunit of the American Fisheries Society (Isely)

- Faculty Advisory Committee Oregon State University Research Forest (Roby)
- Faculty co-adviser, American Fisheries Society Student Subunit, School of Aquatic and Fisheries Sciences, University of Washington (Beauchamp)
- Faculty Facilitator, McNair Scholars Program (Drobney)
- Faculty Research Steering Committee, Cornell Center for the Environment, Cornell University. (Bain)
- Faculty retreat committee (Schramm)
- Faculty Search Committee (Carthy, Conway, La Peyre, Fulton)
- Fish and Wildlife Academic Program Executive Committee (Kwak)
- Franbrook Farm Council, Member (Ribic)
- Freshwater Laboratory Facilities Committee, School of Aquatic and Fisheries Sciences, University of Washington (Beauchamp)
- Freshwater/Marine Biomedical Science Center Scientific Advisory Committee(Schreck)
- Governance Committee (Ribic)
- Graduate Admissions Committee (Otis, Schreck)
- Graduate Committee, Oregon State University Department of Fisheries & Wildlife (Roby)
- Graduate Curriculum Committee, Ecology, Evolution and Conservation Biology program, University of Hawaii, 2001 (Parrish)
- Graduate Enrollment Management Planning Committee (Drobney)
- Graduate Faculty Senate (Drobney)
- Graduate Instruction Committee, Zoology Department (Birkeland)
- Graduate Integration Program (Donovan)
- Graduate Policy Committee (Bettoli)
- Graduate Program Committee (Kitchens)
- Graduate Standards Committee, School of Natural Resources (Parrish)
- Graduate Student Orientation Committee (Schreck)
- Graduate Student Recruitment Committee, College of Agriculture, Food and Natural Resources (Drobney)
- Graduate Studies Committee (Krementz)
- Institute of Biotechnology, Texas Tech University (Parker)
- Institute for Environmental Studies, UW (Ribic)
- Institutional Animal Care and Use Committee (Mather)
- International Programs (Collazo)
- Invited member of the Cornell University New Life Science Initiative Speakers' Bureau (Bain)
- Library Representative (Chipps)
- Logistics Chair, Diagnostic Exams Committee, Zoology Department, University of Hawaii, 2001 (Parrish)
- Long Range Planning Committee, Department of Fisheries, Wildlife, and Conservation Biology (Andersen)
- Management and Budget Committee, UAF/IAB (Margraf)
- Minority Mentoring Program, University of Florida (Carthy)
- Missouri's Missouri River Institute (Galat)
- Natural Resources Chairs Discussion Group (Percival)
- New Faculty Position Development Committee (Boal)
- Organismic and Evolutionary Biology Graduate Program Steering Committee (Sievert)
- Probation Committee, Wildlife and Fisheries Department (Miranda)
- Program Advisory Group, Product and Process Review Committee, Dirt and Gravel Roads Program (Snyder)
- Promotion and Tenure Committee (Allen)

- Promotion and Tenure Mentoring Committees, Department of Fisheries and Wildlife Sciences (Drobney)
- Promotion and Tenure Monitoring Committee, Department of Fisheries and Wildlife Sciences (Rabeni)
- Provost's Office Budget Review Committee (Drobney)
- Range Wildlife & Fisheries Communication Committee (Parker)
- Recruitment, Admissions and Scholarship Committee, School of Aquatic and Fishery Sciences, University of Washington (VanBlaricom)
- Representative of the School of Aquatic and Fishery Sciences, Diving Safety Committee, University of Washington (VanBlaricom)
- Representative, from Department of Fisheries and Wildlife Sciences, to Missouri Resources Assessment Partnership (MoRAP) (Galat)
- Representative, from The School of Natural Resources, to Executive Committee, University of Missouri's Missouri River Institute (Galat)
- Representative, from The School of Natural Resources, to University of Missouri's Lewis and Clark Commemoration Committee (Galat)
- Representative, University Library Committee (Mitchell)
- Research Advisory Committee (Griffith)
- Research Collaborator, Auburn University Fish Collection (Irwin)
- Research Facilities Committee (Vaughan)
- Research, Extension, and International Policy and Affairs Committee (Vaughan)
- Research and Scholarship Committee, University of Vermont (Parrish)
- School Environment Committee (Snyder)
- Search Committee, Wildlife Ecology (Gipson)
- Search Committee, Assistant Unit Leader (Congleton)
- Search Committee, Assistant/Associate Professor of Wildlife Ecology (2002-2003)(McGuire)
- Search Committee, Avian Ecologist (Anderson)
- Search Committee, Avian Ecologist (Donovan)
- Search Committee, Bioinformatics, Three (3) Positions (McGuire)
- Search Committee, CO Unit Leader (Bergersen)
- Search Committee, Terrestrial and Marine Conservation Positions (Parrish)
- Seminar and Lecture Committee (Afton)
- Seminar Committee (Thompson)
- Seminar Coordinator, Life Sciences Seminar Series of the Institute of Arctic Biology and the Department of Biology and Wildlife, University of Alaska Fairbanks (Griffith)
- Social Committee, Department of Fisheries and Wildlife (Vondracek)
- Space Committee, School of Natural Resources (Donovan)
- Space Utilization Committee, UAF/IAB(Margraf)
- Spatial Information Analysis Consortium, Auburn University (Irwin)
- Strategic Planning Committee, Department of Biology (Parker)
- Symposium Committee, College of Natural Resources & Environment (Percival)
- Tester Organizing Committee (Birkeland)
- University Research Ethics Short-Course Development Committee (Schreck)
- Weaver Lecture Series Selection Committee (Grand)
- WEC Advisory Council Committee (Percival)
- Women's Caucus (Irwin)
- Zoology Departmental Liason to Library (Hightower)

PROFESSIONAL SERVICE AND INVOLVEMENT

Editorships

- Acta Scientiarum (Miranda)
- Animal Biodiversity and Conservation, Museum of Zoology, Barcelona (Conroy)
- Aquaculture (Schreck)
- Asian Marine Biology (Birkeland)
- Auk (Powell)
- Biological Conservation (Wright)
- Bioscience, Editorial Board (Scott)
- Canadian Journal of Fisheries and Aquatic Sciences (Parrish)
- Caribbean Journal of Science (Collazo)
- Comparative Biochemistry and Physiology (Schreck)
- Conservation Biology (Angermeier, Donovan, Neves)
- Conservation Ecology (Allen)
- Diseases of Aquatic Organisms (Schreck)
- Ecological Applications (McGuire)
- Ecological Modelling (Edwards)
- Fish Physiology and Biochemistry (Patino)
- Fisheries Management and Ecology (Margraf)
- Freshwater Biology (Angermeier)
- General and Comparative Endocrinology (Patino, Schreck)
- Global Aquaculture Advocate (Parker)
- Journal of Applied Aquaculture (Parker)
- Journal of Mammalogy, Editorial Panel (Leslie)
- Journal of Mammalogy, Special Features Editor (Leslie)
- Journal of Raptor Research (Boal)
- Journal of Wildlife Management (Boal)
- Journal of the World Aquaculture Society (Patino)
- Kansas Department of Wildlife and Parks, Wildlife Bulletin, Number 4, Guest Editor (Gipson)
- Marine Ecology Progress Series (Birkeland)
- Micronesica (Birkeland)
- Natural Areas Journal (Wright)
- Neotropical Ornithology Society: Regional Editor (Caribbean) and Memorials Editor (Wiley)
- North American Journal of Fisheries Management (Magoulick)
- Proceedings of the International Canada Goose Symposium (Andersen)
- Proceedings of the Second International Northern Goshawk Symposium (Andersen)
- Proceedings of the Second International Wildlife Management Congress (Sievert)
- Proceedings of the South Dakota Academy of Sciences (Chipps)
- Regulated Rivers Research and Management (Galat)
- River Research and Applications (Galat)
- Society for the Conservation and Study of Caribbean Birds: SCSCB Bulletin (Wiley)
- Southeastern Naturalist (Bounds, Jennings, Layzer, Vaughan)

- South Dakota Academy of Science (Higgins)
- Transactions of the American Fisheries Society (Jennings)
- Waterbirds (Wiley)
- Western Foundation of Vertebrate Zoology; publications series (Wiley)
- Wetlands (Duffy)
- Wildlife Monographs (Andersen)
- Wildlife Society Bulletin (Gipson, Leslie)

Professional Society, Officer Positions

- Board of Directors, American Fisheries Society, Southern New England Chapter (Mather)
- Board of Directors (Director At-Large), Raptor Research Foundation (Wood)
- Board of Governors, Society for Conservation Biology (Thompson)
- Board Member at Large, The Wildlife Society, Oklahoma Chapter (Leslie)
- Board Member, Association of Field Ornithologists' (V[illegible]ella)
- Chair-Elect, The Wildlife Society, Biometrics Working Group (Diefenbach)
- Chairman, Oklahoma Academy of Science (Winkelman)
- Chair, The Wildlife Society, Biometrics Working Group (Ribic)
- Chair, International Union for Conservancy of Nature (Percival)
- Co-Chair, The Wildlife Society, Gender and Ethnic Diversity Committee (Bounds)
- Executive Board, Cooper Ornithological Society (Roby)
- Executive Board, International Association for Bear Research and Management, IBA council (Vaughan)
- Executive Board Member, Society for Wetland Scientists, Southeast Regional Chapter (La Peyre)
- Executive Board, The Wildlife Society, Alabama Chapter (Grand)
- Panel Member, National Academy of Sciences (Bryan)
- President, The Wildlife Society, Arkansas Chapter (Krementz)
- President, American Fisheries Society, Early Life History Section (Isely)
- President, International Federation of Fish Endocrinologists (Schreck)
- President, American Fisheries Society, Oklahoma Chapter (Winkelman)
- President, Freshwater Mollusk Conservation Society (Neves)
- President Elect, American Fisheries Society, North Carolina Chapter (Kwak)
- President Elect, American Fisheries Society, Oklahoma Chapter (Winkelman)
- President Elect, American Fisheries Society, West Virginia Chapter (Mazik)
- President Elect, The Wildlife Society, Iowa Chapter (Koford)
- Secretary, The Wildlife Society, Biometrics Working Group (Otis)
- Vice President, Maryland Aquaculture Association (Hughes)

Professional Society, Committees

Committee Chairs

- Board of Directors, Nominating Committee, Cooper Ornithological Society (Powell)
- Chair, Technical Commitee on the Status of Northern Goshawks, Raptor Research Foundation/The Wildlife Society (Andersen)
- Chair, Publications Committee, American Society of Mammalogists (Leslie)
- Chair, Scholarship Committee, American Fisheries Society (Vondracek)
- Chair, Awards Committee, The Wildlife Society, Oklahoma Chapter (Leslie)
- Chair, Genetics & Biodiversity Subcommittee, American Fisheries Society, Northcentral Division (Sloss)
- Chair, Publications Awards Comittee, American Fisheries Society (Peterson)
- Chair, Student Affairs Committee, American Fisheries Society, Southern Division (Welsh)
- Chair of Workshops, Program Committee for 2003 Annual Meeting , The Wildlife Society (Diefenbach)
- Chair of a section of Hawaii Aquatics Conference 2001, Hawaii Aquatics Conference of the Hawaii Aquatics Conference - Planning for a sustainable future. (Birkeland)
- Co-Chair, Advertising and Display Committee, Advertising & Display Committee, American Fisheries Society (Parker)
- Chair, Awards Committee, Raptor Research Foundation (Wood)
- Chair, Awards Committee, The Wildlife Society, Oklahoma Chapter (Leslie)
- Chair, Progam Committee, 2003 Meeting, American Fisheries Society, Southern Division (Kwak)
- Chair, Seminar Committee, American Fisheries Society, Humboldt Chapter (Wilzbach)
- Chair, Threatened and Endangered Species Committee, The Wildlife Society, Mississippi Chapter (Vilella)
- Chair, Wildlife Program Committee, The Wildlife Society, Midwest Fish and Wildlife Conference (Koford)
- Chairman, Publications Committee for the Third International Wildlife Management Congress in Christchurch, New Zealand, The Wildlife Society (Bissonette)
- Chairman, Awards Committee, Natural Areas Association (Scott)
- Chairman, Edward T. LaRoe III Award Committee, Society for Conservation Biology (Scott)
- Chairperson North American Journal Of Aquaculture Subcomittee, American Fisheries Society, Best Publication Committee (Hughes)
- Chariman, Conference Guidelines Committee, International Association for Bear Research and Management (Vaughan)
- Co-Chair, Advertising and Display Committee, Advertising & Display Committee, American Fisheries Society (Parker)
- Co-Chair, Program Committee, 2004 Meeting, American Fisheries Society (Kwak)
- Co-Chair, Poster Session, Northeast Fish and Wildlife Conference, The Wildlife Society, Northeast Section (Krohn)
- Chair, Ad Hoc Committee for revamping Bylaws, American Fisheries Society (Caldwell)
- Constitutional Consultant, American Fisheries Society (Margraf)
- Council Member, American Institute of Biological Sciences (Berry, Scott)

Committee Memberships

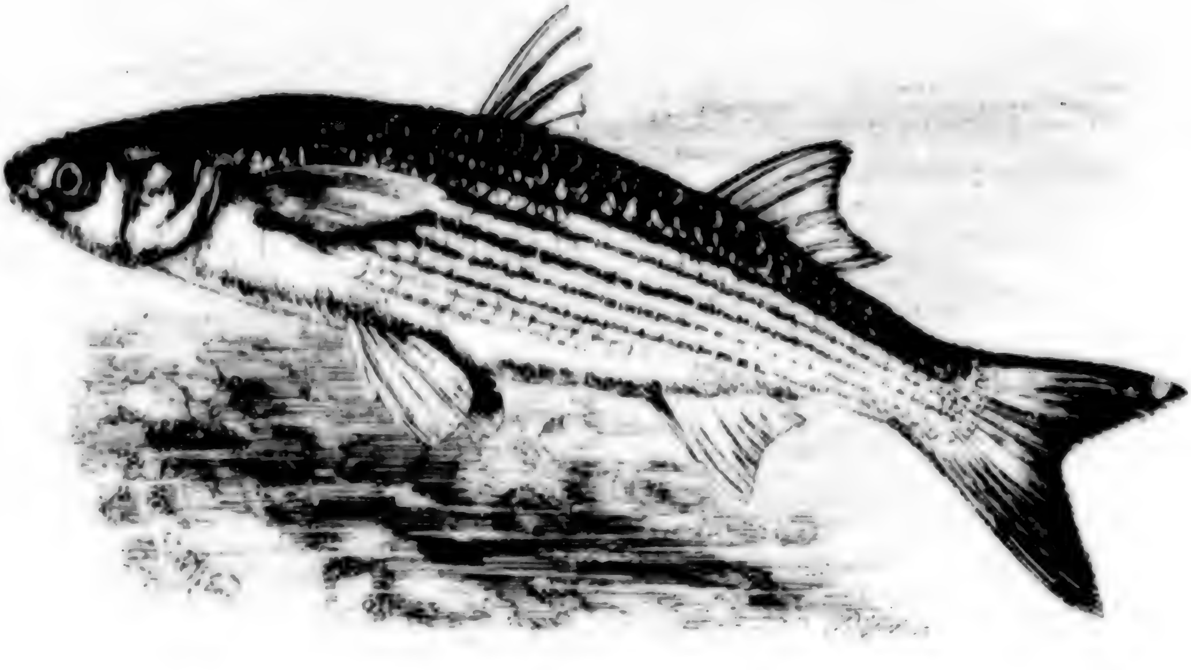
- Aldo Leopold Award Committee, The Wildlife Society (Gipson)
- Arrangements Committee for Annual Meeting, 2003, The Wildlife Society (Donovan)
- Awards Committee, American Fisheries Society, North Carolina Chapter (Kwak)
- Awards Committee, The Wildlife Society (Drobney)
- Best Journal Paper Award Committee, North American Journal of Fisheries Management, American Fisheries Scoiety (Bettoli)
- Best Journal Paper Award Committee, American Fisheries Society (Rabeni)
- Continuing Education Committee, American Fisheries Society (Fisher)
- Education Committee, American Fisheries Society (Schramm)
- Electronic Publishing Committee, The Wildlife Society (Thompson)
- Endangered Species Committee, American Fisheries Society (Neves)
- Finance Committee, Cooper Ornithological Society (Edwards)
- Financial Planning Committee, Raptor Research Foundation (Wood)
- Fishery Educator of the Year Committee, American Fisheries Society (Schreck)
- Ictalurid Technical Committee, American Fisheries Society (Berry)
- Leadership Committee, American Fisheries Society (Schramm)
- Management Committee, American Fisheries Society (Isely)
- Maughan Scholarship Committee, American Fisheries Society, Western Division (Wilzbach)
- Membership Committee, American Institute of Fishery Research Biologists (Jennings, Margraf)
- Nominating Committee, American Fisheries Society (Parrish)
- Nominating Committee, North American Benthological Society (Rabeni)
- Policy Committee, Natural Areas Association (Scott)
- Publication Awards Committee, American Fisheries Society (Kwak)
- Publication Overview Committee, American Fisheries Society (Parrish)
- Student Affairs Committee, American Fisheries Society (Winkelman)
- Resolutions Committee, American Fisheries Society (Bozek)
- Planning Committee, Mid-Year Meeting, American Fisheries Society, Southern Division (Winkelman)
- Planning Committee, Third International Wildlife Management Congress in Christchurch, New Zealand, of the The Wildlife Society (Bissonette)
- Planning and Finance Committee, American Society of Mammalogists (Leslie)
- SEAFWA Program Committee, American Fisheries Society, Southern Division (Mazik, Welsh)
- Special Committee on Revised Employment Standards for Federal Fisheries Positions, American Fisheries Society (Margraf)
- Steering Committee, American Fisheries Society, Early Life History Section (Isely)
- Steering Committee, Midwest Fish and Wildlife Conference (Andersen)
- Steering Committee for Climate Change Symposium, American Fisheries Society (Carline)
- Student Travel Awards Committee, 3rd North American Ornithological Conference (Wood)
- Technical Session Committee, N. American Wildlife and Natural Resources Conference, (Thompson)
- Time and Place Committee, American Fisheries Society (Caldwell)
- Travel Awards Committee, American Institute for Fishery Research Biologists (Caldwell)
- Waterfowl/Wetlands Committee, The Wildlife Society (Higgins)
- Wild Turkey Committee, The Wildlife Society, Southeastern Section (Vaughan)
- Youth Education and Aldo Leopold Education Program Committee, Pheasants Forever, Inc (Higgins)

Memberships on Task Forces, Recovery Teams, Ecosystem Teams, etc.

- Advisory Board for CALFED's Restoration of the San Francisco Bay-Delta Ecosystem Commission (Angermeier)
- Advisory Board for ORSANCO's Development of a Fish-Based Index to Assess Biotic Integrity of Ohio River Commission (Angermeier)
- Advisory Committee, Conservation Biology Department, Vermont Institute of Natural Sciences Task Force (Donovan)
- Advisory Council, U.S. Department of Commerce of the North Western Hawaiian Island - Coral Reef Ecosystem Sanctuary (Birkeland)
- Alaska Shorebird Working Group (Powell)
- Board Member, Scientific Advisory Committee Member Alaska Bird Observatory (Powell)
- Board of Directors, The Resilience Alliance (Allen)
- Board of Directors Pheasants Forever, Inc. (Higgins)
- Board of Trustees, Virginia Museum of Natural History. Five year appointment (Neves)
- Boreal Partners in Flight Task Force (Powell)
- Canada Goose Committee of the Atlantic Flyway Council Technical Section (Malecki)
- Chair of Striped Bass Tagging Committee Atlantic States Marine Fisheries Commission (Welsh)
- Chair, Minnesota Institute for Sustainable Agriculture Board (Vondracek)
- Co-Chair Caiman Yacare Workshop (Percival)
- David H. Smith Memorial Grants Advisory Board (Scott)
- Direct Control and Alternative Harvest Measures Committee of the Arctic Goose Joint Venture Board of the North American Waterfowl Management Program (Malecki)
- Dwarf Wedgemussel Recovery Team Recovery Team (Neves)
- Effectiveness Monitoring Workgroup for the Northern Spotted Owl. (Anthony)
- Emiquon Wetlands Restoration Project Illinois Nature Conservancy Science Advisory Council (Galat)
- EPP Canada Goose Technical Section of the Mississippi Flyway Council (Andersen)
- FIFRA Science Advisory Panel, Food Quality Protection Act Board, US EPA, Washington, D.C. Research Grade Evaluation Panel (Grue)
- Fish and Otter Advisory Committee Missouri Department of Conservation (Rabeni)
- For Mussel Mitigation Trust Fund Peer Review Committee (Neves)
- Forestry-Wildlife Subcommittee, USDA WHIP (Donovan)
- Grassland Bird Recovery Team Recovery Team (Donovan)
- Great Lakes Fishery Commission Acoustics Working Group (Parrish)
- Great Plains Fishery Workers (Bergersen)
- Green Sturgeon Biological Review Team (Hightower)
- Hawaii Aquatics Conference 2001 Organization Committee, Hawaii Aquatics Conference 2001 Organization Committee (Birkeland, Parrish)
- Heartland Monitoring/Assessment Committee National Park Service (Rabeni)
- IAFWA American Woodcock Task Force (Krementz)
- Idaho Reperatory Theatre Community Board (Moffitt)
- Independent Multidisciplinary Science Team - appointed by Governor, Speaker of the House and Senate President (Oregon) (Schreck)
- International Advisory Board, Seventh International Symposium on the Reproductive Physiology of Fish, Mie, Japan International Advisory Board (Patino)
- International Short-tailed Albatross Research Team (Sievert)

- IUCN, Crocodile Specialist Group (Percival)
- James River Watershed Development Steering Committee (Berry)
- Lake Champlain Ecosystem Team Ecosystem Team (Donovan, Parrish)
- Lake Champlain Fish and Wildlife Management Cooperative Fisheries Subcommittee (Parrish)
- Lake Sturgeon Restoration Committee (Layzer)
- Land Stewardship Project (Vondracek)
- Lead Technical Advisor Interagency Caspian Tern Working Group (Roby)
- Marbled Murrelet Effectiveness Monitoring Work Group (Roby)
- Member in charge of short-tailed albatross population viability analyses Recovery Team (Sievert)
- Mentor, 2+2+2 Native American Internship Program (Berry)
- Midwest Region Monitoring Task Force Task Force (Rabeni)
- Mississippi Flyway Technical Committee, USGS representative (Otis)
- Missouri River Science Plan Writing Team U.S. Geological Survey (Galat)
- Missouri River Scientific Review Panel U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers (Galat)
- Monitoring and Inventory Working Group LMAV JV migratory bird science team (Krementz)
- Mourning Dove Strategic Planning Committee (Otis)
- National Conservation Plan for Freshwater Mussels Steering Committee (Neves)
- National Science Advisory Board, The Nature Conservancy (Scott)
- National Wild Turkey Federation (Vaughan)
- North Carolina Scientific Council on Fishes (Kwak)
- Niangua Darter Recovery Team Recovery Team (Galat)
- NMFS recovery team for southern Oregon/northern California ESU coho salmon Recovery Team (Duffy)
- Northwest Fishery Science Center, Scientific Review Team (Schreck)
- Ohio River Ecosystem Team; Mussel Subcommittee Ecosystem Team (Neves)
- Palouse Land Trust, Committee Member (Wright)
- Panel Chair, Hawaii Aquatics Conference 2001 (Parrish)
- Panel Discussion Member 2nd International Symposium on GIS Spatial Analyses in Fisheries and Aquatic Sciences (Fisher)
- Pennsylvania Biological Survey, At-large Member (Diefenbach)
- Plan Team, Western Pacific Regional Fishery Management Council (WPRFMC) of the Western Pacific Regional Fishery Management Council (WPRFMC) - Coral Reef Ecosystem Fisheries Management (Birkeland)
- Potlatch Corporation Community Advisory Board (Moffitt)
- Research Advisory Team, State of Hawaii of the North West Hawaiian Island Research and Monitoring Program (NOWRAMP) (Birkeland)
- Rethinking Deer Management from an Ecological Perspective Steering Committee (Diefenbach)
- Reviewer Research Grade Evaluation Panel (Schramm)
- Roanoke River Fisheries Technical Group Public Panel (Hightower)
- Robust Redhorse Technical Advisory Committee Task Force (Kwak)
- Rocky Mountain Elk Foundation - Proposal Advisory Committee (Thompson)
- Sage Grouse and Shrub-Steppe Conservation Advisory Team Committee (Anthony)
- Science Advisor, Peer Review Panel San Juan River Recovery Implementation Program (Galat)
- Science Steering Committee for the Arctic Community-wide Hydrological Analysis and Monitoring Program (Arctic-CHAMP) (McGuire)

- Science Steering Committee for the Community Arctic Modeling Project (CAMP), a project operated through the International Arctic Research Center (IARC) (McGuire)
- Science Steering Committee for the Study of Environmental Arctic Change (SEARCH) (McGuire)
- Scientific Advisory Board Member, Braddock Bay Bird Observatory, Rochester, NY Advisory Board (Donovan)
- Scientific Advisory Panel Member NC Marine Fisheries Commission (Hightower)
- Scientific Steering Committee of the Montezuma Wetlands Complex Research Institute (Malecki)
- Sea Lamprey Chemical Alternatives Group Sea Lamprey Chemical Alternatives Group (Donovan)
- Southern Appalachians Ecosystem Team (Neves)
- Sport Fishing and Boating Partnership Fisheries Strategic Plan Steering Committee (Moffitt)
- Steering Committee - 2002 National Meeting of Cooperative Research Units, USGS BRD Steering Committee (Patino)
- Steering Committee 2nd International Symposium on GIS Spatial Analyses in Fisheries and Aquatic Sciences (Fisher)
- Steering Committee Institute for Spatial Analysis (Drobney)
- Steering Committee Missouri Resource Assessment Partnership (Drobney)
- Steering Committee, National Contaminants Program Review, USGS BRD Steering Committee (Patino)
- St. Lawrence River Valley (BCR 13) Committee of the North American Bird Conservation Initiative for North American Waterfowl Management Program (Malecki)
- Story County ad hoc Hallett's Quarry Advisory Panel Public Panel (Pierce)
- Tennessee's Rare Mollusk Recovery Committee (Layzer, Neves)
- Upper Middle Rio Grande Ecoteam - U.S. Fish and Wildlife Service (Thompson)
- U.S. Delegate Conservation of Arctic Flora and Fauna (CAFF) Working Group (Roby)
- U.S. Department of Interior of the Interagency Coral Reef Mitigation Task Force (Birkeland)
- USGS All Hands Meeting, Steering Committee Member (Patino)
- USGS CRU Awards Committee (Birkeland, Higgins)
- USGS Water Resources Division, North Carolina District Strategic Science Plan Review Committee Review Panel (Kwak)
- USGS Research Grade Evaluation Panel (Gipson, Grue, Loftin, Thompson)
- Vermont Fish and Wildlife Lake Sturgeon Committee (Parrish)
- Vermont Fish and Wildlife Walleye Management Team (Parrish)
- Vice-Chair of striped bass tagging committee Atlantic States Marine Fisheries Commission (Welsh)
- Virginia Bear Hunters Association (Vaughan)
- Virginia's Mollusk Recovery Team (Neves)
- Waterfowl Technical Committee of the Institute for Environmental Monitoring and Research (Canada) (Malecki)
- Watershed Ecology Team (Duffy, Wilzbach)
- Western Snowy Plover Recovery Team (Powell)
- Western Snowy Plover Technical Team Member (Powell)
- Western Wildlife Research Objectives Workshop (Fulton)
- Wildlife and Fisheries Biology Program, University of Vermont (Donovan)
- Woodcock Wingbee (Krementz)



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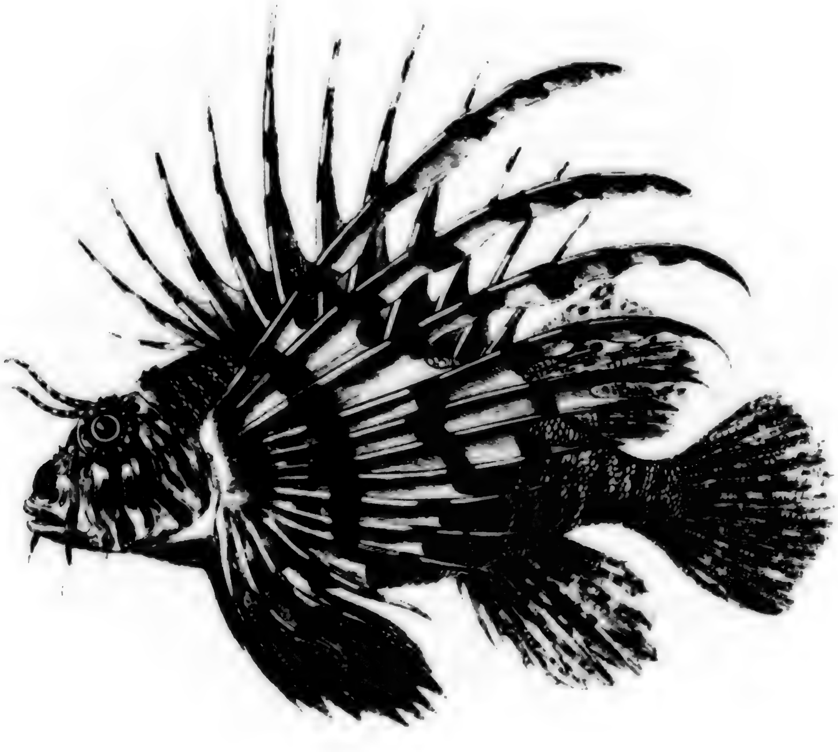

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